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Water quality - Evaluation of the elimination and
biodegradability of organic compounds in an aqueous
medium - Activated sludge simulation test

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

Käesolev Eesti standard EVS-EN ISO 11733:1999 sisaldab Euroopa standardi EN ISO 11733:1998 ingliskeelset teksti.	This Estonian standard EVS-EN ISO 11733:1999 consists of the English text of the European standard EN ISO 11733:1998.
Standard on kinnitatud Eesti Standardikeskuse 12.12.1999 käskkirjaga ja jõustub sellekohase teate avaldamisel EVS Teatajas.	This standard is ratified with the order of Estonian Centre for Standardisation dated 12.12.1999 and is endorsed with the notification published in the official bulletin of the Estonian national standardisation organisation.
Euroopa standardimisorganisatsioonide poolt rahvuslikele liikmetele Euroopa standardi teksti kättesaadavaks tegemise kuupäev on .	Date of Availability of the European standard text .
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English version

**Water quality - Evaluation of the elimination and biodegradability
of organic compounds in an aqueous medium - Activated sludge
simulation test (ISO 11733:1995)**

Qualité de l'eau - Evaluation de l'élimination et de la
biodégradabilité des composés organiques en milieu
aqueux - Essai de simulation des boues activées (ISO
11733:1995)

Wasserbeschaffenheit - Untersuchung der Elimination und
der biologischen Abbaubarkelt organischer Verbindungen
in einem aquatischen Medium - Belebtschlamm-
Simulationstest (ISO 11733:1995)

This European Standard was approved by CEN on 21 June 1998.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Foreword

The text of the International Standard from Technical Committee ISO/TC 147 "Water quality" of the International Organization for Standardization (ISO) has been taken over as an European Standard by Technical Committee CEN/TC 230 "Water analysis", the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by January 1999, and conflicting national standards shall be withdrawn at the latest by January 1999.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

Endorsement notice

The text of the International Standard ISO 11733:1995 has been approved by CEN as a European Standard without any modification.

NOTE: Normative references to International Standards are listed in annex ZA (normative).

Water quality — Evaluation of the elimination and biodegradability of organic compounds in an aqueous medium — Activated sludge simulation test

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 elimination and biodegradability of organic compounds at a given concentration by aerobic microorganisms. The conditions described simulate a waste-water treatment plant.

The method applies to organic compounds that under the test conditions are

- water-soluble at the chosen test concentration;
- satisfactorily dispersable in water and allow dissolved organic carbon (DOC) measurements;
- non-volatile, or have a negligible vapour pressure;
- not inhibitory to the microorganisms of the inoculum at the test concentration.

Inhibition can be determined by using a suitable test method (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 6060:1989, *Water quality — Determination of the chemical oxygen demand*.

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

ISO 10304-2:1995, *Water quality — Determination of dissolved anions by liquid chromatography of ions — Part 2: Determination of bromide, chloride, nitrate, nitrite, orthophosphate and sulfate in waste water*.

ISO 10634:1995, *Water quality — Guidance for the preparation and treatment of poorly water-soluble or-*

ganic compounds for the subsequent evaluation of their biodegradability in an aqueous medium.

ISO 11732:—¹⁾, *Water quality — Determination of ammonium nitrogen by flow analysis and spectrometric detection*.

ISO 11923:—¹⁾, *Water quality — Determination of suspended solids by filtration through glass-fibre filters*.

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 constituents (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: The amount of solids obtained by filtration or centrifugation of a known volume of sludge under specified conditions and drying at 105 °C to constant mass.

3.4 pre-exposure (or pre-adaptation): The pre-incubation of an inoculum in the presence of the test compound, with the aim of enhancing the ability of the inoculum to degrade the test compound. If the aim is achieved, the inoculum is said to be adapted.

4 Principle

This method is designed to determine the elimination and, under some circumstances, the primary or ultimate biodegradation of water-soluble organic compounds by aerobic microorganisms in a continuously operated test system simulating the activated sludge process. An easily biodegradable organic medium and the organic test compound are the source of carbon and energy for the microorganisms.

Two continuously operating test units (activated sludge plants or porous pots) are run in parallel under identical conditions, with a mean hydraulic retention time of normally 6 h and a mean sludge age (sludge

retention time) of 6 d to 10 d. The test compound is normally added at a concentration between 10 mg/l DOC and 20 mg/l DOC, to the influent (organic medium) of only one of the test units; the second unit is used as a control unit to determine the biodegradation of the organic medium.

In regularly taken samples of the effluents, the DOC or chemical oxygen demand (COD) and/or, if required, the test compound concentration are measured by specific analysis. The difference between the effluent concentrations in the test and control units compared with the influent concentration of the test compound is used to determine the elimination of the test compound. Depending on the elimination characteristics, a biodegradability value can be determined.

5 Test environment

The test shall take place in diffused light or in the dark, in an enclosure which is free from vapours that are toxic to microorganisms and at a controlled temperature in the range 20 °C to 25 °C. For special purposes, it is permissible to use a test temperature in another range.

6 Reagents and materials

6.1 Tap water, containing less than 3 mg/l of DOC.

6.2 Deionized water, containing less than 2 mg/l of DOC.

6.3 Organic medium

Synthetic sewage, domestic sewage or a mixture of both is permissible as the organic medium. The acidity and alkalinity of the organic medium should be known. Measure the DOC or COD concentration in each new batch of organic medium.

6.3.1 Synthetic sewage

Peptone	160 mg
Meat extract	110 mg
Urea	30 mg
Anhydrous dipotassium hydrogen phosphate (K_2HPO_4)	28 mg
Sodium chloride (NaCl)	7 mg
Calcium chloride dihydrate ($CaCl_2 \cdot 2H_2O$)	4 mg
Magnesium sulfate heptahydrate ($MgSO_4 \cdot 7H_2O$)	2 mg
Tap water (6.1)	1 litre

1) To be published.