
**Plastics — Determination of the ultimate
anaerobic biodegradation and
disintegration under high-solids
anaerobic-digestion conditions —
Method by analysis of released biogas**

*Plastiques — Évaluation de la biodégradation anaérobie ultime et de la
désintégration dans des conditions de digestion anaérobie à teneur
élevée en solides — Méthode par analyse du biogaz libéré*



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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.

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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 15985 was prepared by Technical Committee ISO/TC 61, *Plastics*, Subcommittee SC 5, *Physical-chemical properties*.

Introduction

New types of plastic are being developed in which biodegradability is a specifically sought-for characteristic. These plastics and derived products can be added to or used as feedstock for biological recycling and recovery in aerobic composting plants or anaerobic biogasification plants. To make sure these plastics are fit for biological recycling, their biodegradability must be demonstrated, preferably by standard test methods.

Standard test methods which determine the degree of biodegradation under aerobic, high-solids conditions have been developed (e.g. ISO 14855). However, it is well known from the literature that the degree of biodegradation can differ significantly depending on the environmental conditions such as the presence or the absence of oxygen (aerobic or anaerobic). To have a complete understanding of the biodegradation characteristics of a plastic under these different environmental conditions, various methods are required.

This International Standard specifies a method for the determination of the ultimate anaerobic biodegradation of plastic materials under high solids conditions. This is representative of systems for the anaerobic biogasification of the organic fraction of municipal solid waste. Another method for determining the degree of anaerobic biodegradation is ISO 11734. However, this method is designed for soluble test materials in aqueous test conditions and at low concentrations (typically detergents) which is not typical of plastics. In addition, it is not possible to determine the degree of disintegration in an aqueous method.

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Plastics — Determination of the ultimate anaerobic biodegradation and disintegration under high-solids anaerobic-digestion conditions — Method by analysis of released biogas

1 Scope

This International Standard specifies a method for the evaluation of the ultimate anaerobic biodegradability of plastics based on organic compounds under high-solids anaerobic-digestion conditions by measurement of evolved biogas and the degree of disintegration at the end of the test. This method is designed to simulate typical anaerobic digestion conditions for the organic fraction of mixed municipal solid waste. The test material is exposed in a laboratory test to a methanogenic inoculum derived from anaerobic digesters operating only on pretreated household waste. The anaerobic decomposition takes place under high-solids (more than 20 % total solids) and static non-mixed conditions. The test method is designed to yield the percentage of carbon in the test material and its rate of conversion to evolved carbon dioxide and methane (biogas).

The conditions described in this International Standard may not always correspond to the optimum conditions for the maximum degree of biodegradation to occur.

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 8245, *Water quality — Guidelines for the determination of total organic carbon (TOC) and dissolved organic carbon (DOC)*

3 Terms and definitions

3.1

ultimate anaerobic biodegradation

breakdown of an organic compound by microorganisms in the absence of oxygen to carbon dioxide, methane, water and mineral salts of any other elements present (mineralization) plus new biomass

3.2

disintegration

physical breakdown of a material into very small fragments

3.3

total dry solids

amount of solids obtained by taking a known volume of test material or inoculum and drying at about 105 °C to constant mass