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**Plastics — Determination of the ultimate  
anaerobic biodegradation of plastic  
materials in an aqueous system —  
Method by measurement of biogas  
production**

*Plastiques — Évaluation de la biodégradabilité anaérobie ultime des  
matériaux plastiques en milieu aqueux — Méthode par détermination  
de la production de biogaz*



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# Contents

Page

<b>Foreword</b> .....	<b>iv</b>
<b>Introduction</b> .....	<b>v</b>
<b>1 Scope</b> .....	<b>1</b>
<b>2 Normative references</b> .....	<b>1</b>
<b>3 Terms and definitions</b> .....	<b>2</b>
<b>4 Principle</b> .....	<b>3</b>
<b>5 Reagents and materials</b> .....	<b>3</b>
<b>6 Apparatus</b> .....	<b>6</b>
<b>7 Procedure</b> .....	<b>6</b>
<b>8 Calculation and expression of results</b> .....	<b>10</b>
<b>9 Validity of results</b> .....	<b>12</b>
<b>10 Test report</b> .....	<b>13</b>
<b>Annex A</b> (informative) <b>Example of apparatus for determining the amount of biogas produced by measuring the increase in gas pressure</b> .....	<b>14</b>
<b>Annex B</b> (informative) <b>Example of apparatus for determining volumetrically the amount of biogas produced</b> .....	<b>15</b>
<b>Annex C</b> (informative) <b>Example of a biodegradation curve</b> .....	<b>17</b>
<b>Annex D</b> (informative) <b>Examples of data sheets for anaerobic biodegradability tests</b> .....	<b>18</b>
<b>Annex E</b> (informative) <b>Table of water vapour pressures at various temperatures</b> .....	<b>21</b>
<b>Annex F</b> (informative) <b>Calculation of theoretical carbon dioxide (ThCO<sub>2</sub>) and theoretical methane (ThCH<sub>4</sub>) production</b> .....	<b>22</b>
<b>Annex G</b> (informative) <b>Example of determination of recovery rate</b> .....	<b>23</b>
<b>Annex H</b> (informative) <b>Example of a workflow scheme</b> .....	<b>26</b>
<b>Bibliography</b> .....	<b>28</b>

## 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 14853 was prepared by Technical Committee ISO/TC 61, *Plastics*, Subcommittee SC 5, *Physical-chemical properties*.

## Introduction

With the increasing use of plastics, their recovery and disposal have become a major issue. As a first priority, recovery should be promoted. For example plastic litter, which originates mainly from consumers, is difficult to recover completely. Additional examples of materials difficult to recover are found in the disposal of fishing tackle, agricultural mulch films and water-soluble polymers. These plastic materials tend to leak from closed waste management infrastructures into natural environments. Biodegradable plastics are now emerging as one of the available options to solve such environmental issues. Plastic materials such as products or packaging which are sent to anaerobic treatment facilities should be potentially biodegradable. Therefore it is very important to determine the potential biodegradability of such materials and to obtain a quantitative measure of their biodegradability in anaerobic environments.



# Plastics — Determination of the ultimate anaerobic biodegradation of plastic materials in an aqueous system — Method by measurement of biogas production

**WARNING** — Sewage and activated sludge may contain potentially pathogenic organisms. Therefore appropriate precautions should be taken when handling them. Digesting sewage sludge produces flammable gases which present fire and explosion risks. Care should be taken when transporting and storing quantities of digesting sludge. Toxic test chemicals and those whose properties are not known should be handled with care and in accordance with safety instructions. The pressure meter and microsyringes should be handled carefully to avoid needle stick injuries. Contaminated syringe needles should be disposed of in a safe manner.

## 1 Scope

This International Standard specifies a method for the determination of the ultimate anaerobic biodegradability of plastics by anaerobic microorganisms. The conditions described in this International Standard do not necessarily correspond to the optimum conditions for the maximum degree of biodegradation to occur. The test calls for exposure of the test material to sludge for a period of up to 60 days, which is longer than the normal sludge retention time (25 to 30 days) in anaerobic digesters, though digesters at industrial sites can have much longer retention times.

The method applies to the following materials:

- Natural and/or synthetic polymers, copolymers or mixtures thereof;
- Plastic materials which contain additives such as plasticizers, colorants or other compounds;
- Water-soluble polymers;
- Materials which, under the test conditions, do not inhibit the microorganisms present in the inoculum. Inhibitory effects can be determined using an inhibition control or by another appropriate method (see e.g. ISO 13641). If the test material is inhibitory to the inoculum, a lower test concentration, another inoculum or a pre-exposed inoculum can be used.

## 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)*

ISO 13641 (all parts), *Water quality — Determination of inhibition of gas production of anaerobic bacteria*