

BS 8472:2011



BSI Standards Publication

Methods for the assessment of the oxo-biodegradation of plastics and of the phyto-toxicity of the residues in controlled laboratory conditions

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Summary of pages

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Foreword

Publishing information

This British Standard is published by BSI and came into effect on 30 June 2011. It was prepared by Technical Committee PKW/0, *Packaging*. A list of organizations represented on this committee can be obtained on request to its secretary.

Relationship with other publications

The following standard is similar but different in scope to this standard.

- ASTM D 6954-04, *Standard Guide for Exposing and Testing Plastics that Degrade in the Environment by a Combination of Oxidation and Biodegradation*.

Presentational conventions

The provisions of this standard are presented in roman (i.e. upright) type. Its methods are expressed as a set of instructions, a description, or in sentences in which the principal auxiliary verb is “shall”.

Commentary, explanation and general informative material is presented in smaller italic type, and does not constitute a normative element.

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0 Introduction

0.1 General

The methods described in this British Standard measure the mineralization of the carbon chains of plastic under controlled laboratory conditions, including the presence of soil micro-organisms and oxygen. The partially mineralized products of the degradation and oxo-biodegradation tests can then be assessed for their effect on seed germination and plant growth.

0.2 Title of the standard

The term “oxo-biodegradation” is defined in 3.8 as it is defined in CEN/TR 15351:2006, 5.2 as “degradation identified as resulting from oxidative and cell-mediated phenomena, either simultaneously or successively”.

Oxo-biodegradation is not restricted to man-made polymers. It was first recognized in the biodegradation of natural rubber [1] and it occurs in natural materials such as lignocelluloses, probably mediated by enzymes that produce free radicals [1]. This is analogous to the redox reactions of transition metal ions, where oxygen radicals such as .OH and .OOH are certainly involved in the initiation step. Propagation of the chain reaction occurs primarily on both natural and synthetic products through ROO. This chemistry is readily understood by biochemists since it is widely discussed in both materials and biological chemistry literature (see [1 to 4] and in many text books). Further elaboration in this standard does not seem to be appropriate.

In the environmental exposure of plastics both mechanisms, abiotic and biotic operate together and the micro-organisms rapidly remove the biodegradable oxidation products in a synergistic process. It is difficult and time consuming to reproduce this in the laboratory and for convenience the two processes corresponding to weathering, which is an abiotic process, and biodegradation have to be carried out in separate tests.

ASTM also recognizes the two operations in ASTM D 6954-04. This is oxo-biodegradation, although ASTM does not use this term.

0.3 Use of this standard

This standard defines a specific template to be used for the reporting of results in order to standardize communication and avoid confusion.

This standard is not a specification. Testing according to this standard does not provide any recommendation about the suitability of the tested products for any particular application.

1 Scope

This British Standard describes methods for determining:

- a) degradation by oxidation (abiotic tests);
 - b) biodegradation (biotic test in soil); and
 - c) phyto-toxicity (plant growth tests);
- of plastics materials and products.