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Plastics - Determination of bio-based carbon content

Plastiques - Détermination de la teneur en carbone biosourcé

Kunststoffe - Bestimmung des biobasierten Kohlenstoffgehalts

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Contents

Page

Foreword

This document (CEN/TS 16137:2011) has been prepared by Technical Committee CEN/TC 249 “Plastics”, the secretariat of which is held by NBN.

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Introduction

This Technical Specification specifies the calculation method for the determination of bio-based carbon content in monomers, polymers, plastics materials and products using the ^{14}C method.

This calculation method using the ^{14}C method is based on the well established analytical test methods used for the determination of the age of objects containing carbon.

This Technical Specification provides the reference test methods for laboratories, producers, suppliers and purchasers of bio-based polymer materials and products. It can be also useful for authorities and inspection organizations.

NOTE 1 This Technical Specification is based on EN 15440 [4] prepared by CEN/TC 343, Solid recovered fuels.

NOTE 2 The analytical test methods specified in this Technical Specification are compatible with those described in ASTM D6866 - 10 [9].

1 Scope

This Technical Specification specifies a calculation method for the determination of the bio-based carbon content in monomers, polymers and plastic materials and products, based on the ^{14}C content measurement.

It also specifies three test methods to be used for the determination of the ^{14}C content from which the bio-based carbon content is calculated:

— Method A: Proportional scintillation-counter method (PSM);

— Method B: Beta-ionisation (BI);

— Method C: Accelerator mass spectrometry (AMS).

The bio-based carbon content is expressed by a fraction of sample mass, as a fraction of the total carbon content or as a fraction of the total organic carbon content.

This calculation method is applicable to any polymers containing organic carbon, including biocomposites.

NOTE This Technical Specification does not provide the methodology for the calculation of the biomass content of a sample.

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.

CEN/TR 15932:2010, *Plastics — Recommendation for terminology and characterisation of biopolymers and bioplastics*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in CEN/TR 15932:2010 and the following apply.

3.1
bio-based carbon content
amount of carbon in a sample that is of recent origin, as evidenced by its ^{14}C isotope content

3.2
biomass content
mass fraction of bio-based material in a sample

3.3
organic material
material containing carbon-based compound in which the element carbon is attached to other carbon atoms, hydrogen, oxygen, or other elements in a chain, ring, or three-dimensional structure

3.4
organic carbon
carbon from organic material

3.5
isotope abundance
fraction of atoms of a particular isotope of an element