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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 43282.2-2023

**Plastics - Determination of the aerobic biodegradation of plastic
materials exposed to seawater - Part 2: Method by measuring
the oxygen demand in closed respirometer**

塑料 暴露于海水中塑料材料需氧生物分解的测定 第2部分：采用测定密闭呼吸计
内需氧量的方法

(English Translation)

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Foreword

This document complies with the provisions of GB/T 1.1-2020 "Standardization Work Guidelines Part 1: Structure and Drafting Rules of Standardization Documents" Drafting:

This document is Part 2 of GB/T 43282 "Determination of Aerobic Biodegradation of Plastic Materials Exposed to Seawater":

GB/T 43282 has released the following parts:

---Part 1: Using methods to analyze the release of carbon dioxide;

---Part 2: Method for measuring oxygen demand in a closed respirometer:

This document is equivalent to ISO 23977-2:2020 "Determination of aerobic biological decomposition of plastic materials exposed to seawater - Part 2" Points: Use the method of measuring oxygen demand in a closed respirometer:

Please note that some content in this document may be subject to patents: The publisher of this document assumes no responsibility for identifying patents:

Introduction

It is known that marine debris can cause harm and negative impacts to marine life and humans: The degree of degradation from exposure to the marine environment is One of the factors affecting the impact performance and strength of plastic materials: These products cannot be considered biodegradable and discarded casually in the environment:

It is not advisable and these products also need to be recycled and reused: However, biodegradation of plastics in natural environments (e.g., soil or marine environments) Test methods for extent and rate determination are of interest to better characterize the degradation behavior of plastics in these specific environments: Therefore, biological the degree and rate of degradation are of great significance in revealing the potential biodegradability of plastic materials in different marine environments:

GB/T 43282 "Determination of Aerobic Biological Decomposition of Plastic Materials Exposed to Seawater" is intended to consist of two parts:

---Part 1: Methods for analyzing the release of carbon dioxide: The aim is to identify plastics by measuring the amount of carbon dioxide released the extent and rate of aerobic biological decomposition of materials:

---Part 2: Method for measuring oxygen demand in a closed respirometer: The purpose is to determine the oxygen demand of plastic materials the degree and rate of aerobic biological decomposition of materials:

Both parts describe laboratory test methods for determining the extent and rate of aerobic biological decomposition of plastic materials: But the production of plastic materials the decomposition of plastic materials was measured under laboratory conditions by measuring the oxygen dioxide in closed respirometers when plastic materials were exposed to seawater collected from coastal areas:

Determined by carbon release and oxygen demand:

Several biodegradation test methods for plastic materials under different environmental and

laboratory conditions have been established, as shown in Table 1:

Table 1 Plastic biodegradation test methods

condition

Ambient aerobic/anaerobic experiment method Controlled Composting Conditions Aerobic Conditions GB/T 19277.1-2011 GB/T 19277.2-2013 High solids anaerobic composting conditions Anaerobic conditions GB/T 33797-2017 Anaerobic conditions for controlled sludge digestion system GB/T 38737-2020 Soil aerobic conditions GB/T 22047-2008 aqueous culture medium aerobic conditions anaerobic conditions GB/T 19276.1-2003 GB/T 19276.2-2003 GB/T 32106-2015 Aerobic conditions at the seawater/sandy sediment interface GB/T 40611-2021a GB/T 40612-2021a Aerobic conditions of marine sediments GB/T 40367-2021a Seawater aerobic conditions GB/T 43282.1-2023a this document a a Test method for determining the biodegradability of plastic materials exposed to marine microorganisms:

All marine biodegradation test methods are based on the analysis of plastic materials with marine samples (seawater and/or sediment) taken from coastline areas:

Contact status: From a quantitative point of view, these methods are not equivalent; for example, microbial densities in seawater are generally higher than in sediments:

Degree is low: In addition, the composition and diversity of microorganisms may also differ: And, in general, nutrient concentrations in sediments are usually higher than in seawater the nutrient concentration in it is high:

This document provides a method for determining the level of biodegradation of plastic materials exposed to microbiota in pelagic seawater under laboratory conditions:

test methods: The biodegradation rate is determined by measuring the amount of carbon dioxide released: This test method can be performed with seawater ("Ocean Seawater Test") test"), it can also be carried out using seawater with a small amount of sediment added ("suspended sediment seawater test"):

The pelagic seawater test simulates offshore conditions with low currents and low tidal movements, while the suspended sediment seawater test simulates Possible conditions in coastal areas with strong currents and tidal movements:

Plastics exposed to seawater require oxygen Determination of biodegradation Part 2: Adoption Method for determining oxygen demand in a closed respirometer

1 Scope

This document describes laboratory test methods for determining the extent and rate of aerobic biological decomposition of plastic materials: Biodegradation of plastic materials is this was determined by measuring the oxygen demand of plastic materials exposed to

seawater collected from coastal areas under laboratory conditions in a closed respirometer:

Determined:

The conditions described in this document may not correspond to the optimal conditions for maximum biodegradation to occur: However, this test method is intended to indicate Potential biodegradability of plastic materials:

Note: This document applies to plastic materials and other materials as well:

2 Normative reference documents

The contents of the following documents constitute essential provisions of this document through normative references in the text: Among them, the dated quotations for undated referenced documents, only the version corresponding to that date applies to this document; for undated referenced documents, the latest version (including all amendments) applies to this document:

ISO 5667-3 Water quality sampling Part 3: Preservation and processing of water samples (Waterquality-Sampling-Part 3: Pre-ISO 8245 Guide for determination of total organic carbon (TOC) and dissolved organic carbon (DOC) in water quality [Waterquality-Note: GB/T 38787-2020 Sample preparation method for biodegradation test of plastic materials (ISO 10210:2012, IDT) ISO 10523 Determination of pH of water quality (Waterquality-DeterminationofpH) Note: GB/T 22592-2008 General principles for determination of pH value of water treatment agents (ISO 10523:1994, NEQ)

3 Terms and definitions

The following terms and definitions apply to this document:

pelagiczone

A body of water above the ocean floor:

Note 1: Also called open water or water column:

Note 2: The surface of the pelagic zone will move with wind and waves: It is in contact with the atmosphere and exposed to sunlight: As depth increases, pressure increases, and temperature decreases, light and waves Energy weakens:

[Source: ISO 22766:2020,3:4]