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

GB/T 40611-2021

**Plastics - Determination of aerobic biodegradation of non-floating
plastic materials in a seawater/sandy sediment interface - Method by
measuring the oxygen demand in closed respirometer**

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Foreword

This document is in accordance with the provisions of GB/T 1.1-2020 "Guidelines for Standardization Work Part 1. Structure and Drafting Rules of Standardization Documents"

Drafting.

The translation method used in this document is equivalent to ISO 18830.2016 "Final requirements for non-floating plastic materials at the interface of plastic seawater sandy sediments."

The oxygen biodegradability is determined by the method of measuring oxygen consumption in a closed respirometer.

The Chinese documents that have consistent correspondence with the normatively cited international documents in this document are as follows.

---GB/T 32116-2015 Determination of total organic carbon (TOC) in circulating cooling water (ISO 8245.1999, NEQ)

Introduction

Products made of biodegradable plastics are designed to be recycled through organic cycles in composting plants or anaerobic digesters. Not because

These products are biodegradable and are considered to be freely discarded in the environment. This is undesirable, these products should be recycled and reused

use. However, the test methods for determining the degree and rate of biodegradation of plastics in natural environments (such as soil or marine environments) are worthy of attention.

It can better describe the degradation behavior of plastics in these specific environments. In fact, some products used in the ocean are made of plastic (e.g.

Fishing gear), these products are sometimes lost or intentionally placed in the marine environment. The properties of biodegradable plastic materials can be

Characterized by test methods, these methods can quantitatively evaluate the biodegradability of plastics exposed to marine sediments and seawater.

Plastic products are directly discarded or flow into pelagic areas (free waters) with fresh water.

The effects of damage may sink to the coastal zone and reach the surface of the seafloor. Many biodegradable plastics have a density greater than 1, so they tend to sink. From

From the surface (the interface with the seawater) to the deep layer, the environment of the sediments changes from aerobic to anoxic to anaerobic, showing a sharply changing oxygen gradient.

Plastic seawater sandy sediment interface non-floating plastic

Determination of the final aerobic biodegradability of materials

By measuring the oxygen consumption in a closed respirometer

1 Scope

This document describes a test method that measures the oxygen consumption in a closed respirometer to determine whether plastic materials are at the junction of sea water and the seabed.

The degree and rate of decomposition of aerobic organisms on the ocean sandy sediments.

This test method is to simulate the habitat environment of different seawater sedimentation areas in the ocean under laboratory conditions, such as when the sun hits the bottom of the sea.

The benthic zone (light zone) is called the coastal zone in marine science.

The determination of the biodegradation of plastic materials and other solid materials buried in marine sediments is outside the scope of this document.

The conditions described in this document may be inconsistent with the optimal conditions for maximum biodegradation.

2 Normative references

The contents of the following documents constitute the indispensable clauses of this document through normative references in the text. Among them, dated quotations

Only the version corresponding to that date is applicable to this document; for undated

reference documents, the latest version (including all amendments) is applicable to

This document.

GB/T 19276.1-2003 The determination of the final aerobic biodegradability of the materials in the aqueous culture medium is measured by the airtight respirometer

Method of intermediate oxygen demand (ISO 14851.1999, IDT)

ISO 8245 Water Quality Guidelines for Determination of Total Organic Carbon (TOC) and Dissolved Organic Carbon (DOC) (Waterquality-

Guidelinesforthedeterminationoftotalorganiccarbon(TOC)anddissolvedorganiccarbon(DOC)

3 Terms and definitions

The following terms and definitions apply to this document.

3.1

Biochemical oxygen demand biochemicaloxygendemand

BOD

Under certain conditions, the mass concentration of dissolved oxygen consumed by compounds or organics in water due to aerobic biological oxidation.

Note. Expressed in milligrams of oxygen absorbed per milligram or gram of compound.

3.2

Theoretical oxygen demand theoretical oxygen demand

ThOD

The theoretical maximum value of oxygen required for complete oxidation of the compound can be calculated from the molecular formula.

Note. Expressed in milligrams of oxygen absorbed per milligram or per gram of test material (mgO₂/mg test material or mgO₂/g test material).

3.3

Total organic carbon

TOC

The total carbon content of organic matter dissolved or suspended in water.