

ICS 83.080.01
CCS G 31



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

GB/T 19277.1-2025

Replacing GB/T 19277.1-2011

Determination of the ultimate aerobic biodegradability of plastic materials under controlled composting conditions - Method by analysis of evolved carbon dioxide - Part 1: General method

受控堆肥条件下材料最终需氧生物分解能力的测定 采用测定释放的二氧化碳的方法 第1部分：通用方法

(English Translation)

Issued on: April 25, 2025

Implemented on: November 1, 2025

**Issued by: State Administration for Market Regulation, China National
Standardization Administration**

Table of Contents

- Foreword
- Introduction
- 1 Scope
- 2 Normative references
- 3 Terms and definitions

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 for standardization documents" Drafting.

This document is a follow-up to GB/T 19277 "Determination of the ultimate aerobic biodegradability of materials under controlled composting conditions by measuring the release of Method for determination of carbon dioxide by oxidizing carbon monoxide Part 1: GB/T 19277 has published the following parts.

Part 1: General methods;

Part 2: Gravimetric determination of carbon dioxide evolution under laboratory conditions.

This document replaces GB/T 19277.1-2011 "Determination of the ultimate aerobic biodegradability of materials under controlled composting conditions" Compared with GB/T 19277.1-2011, except for structural adjustment and editorial changes, in addition to the above, the main technical changes are as follows.

--- Changed the requirements for volatile solid content (see 8.1, 8.1 of the 2011 edition).

This document is equivalent to ISO 14855-1:2012 "Determination of the ultimate aerobic biodegradability of materials under controlled composting conditions using test Method for determining the release of carbon dioxide - Part 1: General method.

Introduction

As the problem of plastic pollution becomes increasingly serious, the disposal of solid waste has become a growing concern around the world. How to distinguish between biodegradable GB/T 19277 aims to provide a method to determine the compostability of materials under controlled composting conditions.

This document is intended to consist of two parts.

--- Part 1: General method. This method calculates the amount of carbon dioxide released by the conversion of carbon in the material.

Biodegradability.

--- Part 2: Determination of carbon dioxide release under laboratory conditions by gravimetric analysis. This method is based on accurate measurement of the carbon dioxide release before and after the test.

The weight change of the post-composting system is used to indirectly calculate the release of carbon dioxide, and thus the biodegradation rate.

The test method of this document is to use mature compost as a solid bed (nutrient and thermophilic bacteria-rich inoculum source) under solid phase aerobic conditions.

The mature compost is a heterogeneous and extremely complex material, so it is difficult to identify the polymer material remaining in the bed at the end of the experiment.

It is also difficult to quantify the small molecules that may be released into the solid bed during the degradation of polymers; it is also difficult to assess the biomass and calculate the complete. Another difficulty sometimes encountered with mature composting is the so-called "priming effect", whereby large amounts of organic matter introduced into the compost can Subject to polymer-induced degradation. This induced effect can affect the determination of biodegradability.

In order to overcome these problems and improve the reliability of the method, vermiculite can be used instead of mature compost as the bed medium for testing to facilitate separation.

This improved method determines the biodegradation rate by measuring the carbon dioxide release, thus providing an estimate of the biomass and the polymer residues can be quantified and the carbon balance can be calculated; this method is not affected by the initiation effect and can therefore be used to evaluate the Mineral compost can also be used for biotoxicity analysis to verify biodegradability.

Any toxic activity of the post-solidification bed.

Final aerobic biodegradation of materials under controlled composting conditions the capacity is determined by measuring the carbon dioxide released Methods Part 1: General methods

1 Scope

This document specifies a method for determining the release of materials as organic compounds under controlled composting conditions.

The amount of carbon dioxide released by the solid waste is used to determine its ultimate

aerobic biodegradability and its degree of disintegration.

The test materials were exposed to the inoculum produced by the composting process under strict conditions of temperature, oxygen concentration and humidity.

Composting is carried out under monitored and controlled environmental conditions. This method determines the conversion percentage of carbon in the test material into released carbon dioxide.

Fraction.

8.6 and 8.7 provide for the use of mineral bed instead of mature compost as inoculum rich in thermophilic bacteria (from compost through special treatment pathways) A method for determining the percentage conversion of carbon in a test material into released carbon dioxide.

The conditions described in this document do not always correspond to the optimum conditions under which maximum biodegradation would occur.

2 Normative references

The contents of the following documents constitute essential clauses of this document through normative references in this document.

For referenced documents without a date, only the version corresponding to that date applies to this document; for referenced documents without a date, the latest version (including all amendments) applies to this document.

ISO 8245 Water quality - Guidelines for the determination of total organic carbon (TOC) and dissolved organic carbon (DOC)

3 Terms and definitions

The following terms and definitions apply to this document.

Under aerobic conditions, organic compounds are decomposed by microorganisms into carbon dioxide (CO₂), water (H₂O) and mineralized inorganic salts of the elements they contain.

and new biomass.

Composting

An aerobic process for producing compost.

Note: Compost is an organic soil conditioner obtained by biological decomposition of a mixture consisting mainly of plant residues and sometimes containing some organic material and Certain inorganic substances.

Disintegration

The material physically breaks into extremely small fragments.