

CCS G 31



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

GB/T 33047.3-2021

**Plastics - Thermogravimetry (TG) of polymers - Part 3:
Determination of the activation energy using the
Ozawa-Friedman plot and analysis of the reaction kinetics**

Issued on: August 20, 2021

Implemented on: March 1, 2022

**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 of Standardization Documents"

Drafting.

This document is Part 3 of GB/T 33047 "Plastic Polymer Thermogravimetry (TG)". GB/T 33047 has released the following

part.

---Part 1. General rules;

---Part 2. Determination of activation energy;

---Part 3. Use Ozawa-Friedman plot to determine activation energy and analyze reaction kinetics.

The translation method used in this document is equivalent to ISO 11358-3:2013 "Plastic Polymer Thermogravimetric Method (TG) Part 3. Use

Ozawa-Friedman plots to determine activation energy and analyze reaction kinetics."

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

---GB/T 33047.1-2016 Plastic Polymer Thermogravimetric Method (TG) Part 1. General (ISO 11358-1:2014,

MOD)

---GB/T 33047.2-2021 Plastic Polymer Thermogravimetric Method (TG) Part 2. Determination of Activation Energy (ISO 11358-2.

2014, IDT)

This document was proposed by the China Petroleum and Chemical Industry Federation.

This document is under the jurisdiction of the General Methods and Products Branch of the National Plastics Standardization Technical Committee (SAC/TC15/SC4).

Drafting organizations of this document. Zhonglan Chenguang Chemical Co., Ltd., Sichuan University, Qingdao Dagang Customs of the People's Republic of China, Shandong Dawn High Score

Sub-Materials Co., Ltd., Beijing Yanshan Petrochemical High-tech Technology Co., Ltd., Guangzhou Institute of Quality Supervision and Inspection, Weihai Lianqiao New Materials Materials Technology Co., Ltd., Liaocheng University, CGN Juner (Zhejiang) New Materials Co., Ltd., Shandong Non-metallic Materials Research Institute, Dongguan City Zhengmo Plastic Co., Ltd., Jilin Provincial Product Quality Supervision and Inspection Institute, Global Energy Internet Research Institute Co., Ltd.

Introduction

The controlled weight loss rate thermogravimetric method (CRTG) is used to study the decomposition of polymers, and the Ozawa-Frideman method is usually used for analysis by CRTG

The data obtained is also used to analyze the data obtained by the combination of isothermal thermogravimetry (iso-TG) and conventional linear heating rate thermogravimetry (LHTG).

According to the data, that is, the method of using a constant heating rate.

GB/T 33047, under the general title "Plastic Polymer Thermogravimetry (TG)", consists of the following parts.

---Part 1.General rules;

---Part 2.Determination of activation energy;

---Part 3.Use Ozawa-Friedman plot to determine activation energy and analyze reaction kinetics.

Plastic polymer thermogravimetry (TG)

Part 3.Measurement using Ozawa-Friedman plot

Activation energy and analytical reaction kinetics

1 Scope

This document specifies a method for determining activation energy using Ozawa-Friedman plots. This document also stipulates the use of thermogravimetric method to verify

The method of master curve of reaction kinetics.

Ozawa-Friedman drawing (under a certain mass loss, compose the reciprocal of the temperature under the mass loss with the logarithm of the mass loss rate

Line) is a differential method that can be applied to thermal analysis of any temperature change program, such as constant temperature, constant heating rate, sample volume control heat

Analysis, temperature steps and repeated temperature scans.

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.

ISO 11358-1 Plastics Polymer Thermogravimetry (TG) Method Part 1.General (Plastics-Thermogravimetry (TG) of

polymers-Part 1.Generalprinciples)

ISO 11358-2 Plastics Polymer Thermogravimetric Method (TG) Part 2.Determination of Activation Energy (Plastics-Thermogravimetry

(TG)ofpolymers-Part 2.Determinationofactivationenergy)

3 Terms and definitions

The following terms and definitions defined by ISO 11358-1 and ISO 11358-2 apply to this document.

3.1

Conversion rate

$C = \frac{m_t - m_i}{m_f - m_i}$

Where.

m_i ---initial mass, in milligrams (mg);

m_t ---the mass at a specific time and temperature, in milligrams (mg);

m_f ---Residual mass at the end of the reaction, in milligrams (mg).

See ISO 11358-1 and ISO 11358-2.

Note 1.It is usually also referred to as the mass loss score.

Note 2. The conversion rate is dimensionless, and the value ranges from 0 to 1.

3.2

Generalized time

tgen

chinastandards.org · PREVIEW