

ICS 83.080.01

CCS G 31



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

**GB/T 43297-2023**

---

**Plastics - Methodology for assessing polymer photoaging -  
FTIR and UV/visible spectroscopy**

塑料 聚合物光老化性能评估方法 傅里叶红外光谱和紫外/可见光谱法

**(English Translation)**

**Issued on: November 27, 2023**

**Implemented on: June 1, 2024**

---

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

## Table of Contents

- Foreword
- Introduction
- 1 Scope
- 2 Normative reference documents
- 3 Terms, definitions and abbreviations

### 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 modified to adopt ISO 10640:2011 "Evaluation of polymer photoaging by Fourier transform infrared spectroscopy and UV/visible spectroscopy for plastics" Methods":

Compared with ISO 10640:2011, this document has made the following structural adjustments:

---The first paragraph of Chapter 1 of this document corresponds to the last paragraph of the introduction to ISO 10640:2011;

---Added a chapter "Normative Reference Documents":

The technical differences between this document and ISO 10640:2011 and their reasons are as follows:

---Deleted the second paragraph of Chapter 1 in ISO 10640:2011 (see Chapter 1), which duplicates the content of Chapter 4;

---Change the notes in Chapter 1 of ISO 10640:2011 to the content of the main text (see Chapter 1), expanding the scope of this document;

---Added normative reference document GB/T 1844.1 (see Chapter 2) to facilitate operator use;

---Change Note 2 of 4.2:3:1 in ISO 10640:2011 to the content of the text (see 5.2:3:1) to facilitate the application of the document:

The following editorial changes have been made to this document:

---In order to coordinate with the existing standards, the name of the standard is changed to "Method for Evaluation of Photoaging Properties of Plastic Polymers by Fourier Transform Infrared Spectroscopy and UV/visible spectroscopy";

---Replaced ISO 4892-1 with the informative reference GB/T 16422.1 (see introduction);

---Deleted the abbreviations that overlap with GB/T 1844.1 in Chapter 3 of ISO 10640:2011 to facilitate the use of operators;

---Replaced ISO 4892-2 with the informative reference GB/T 16422.2 (see Appendix A):

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

Evaluating the lifetime of outdoor-exposed polymers by artificially accelerated aging is one of the purposes of artificially accelerated aging: Assessment of artificially accelerated aging Estimating the life of outdoor-exposed polymers is a very difficult task, as explained in GB/T 16422.1[1], Appendix A:

part of the reason for the difficulty, and pointed out that "acceleration factors" should not simply be used to relate the aging time in accelerated testing to the aging time in outdoor exposure testing:

aging time:

Comparing chemical changes caused by artificially accelerated testing with chemical changes caused by outdoor exposure is to evaluate whether artificially accelerated testing can predict outdoor A method that uses material properties:

Although there is not always a direct relationship between chemical changes and performance changes, in appearance (such as loss of gloss, fading, yellowing, bleaching, Microcracks, etc.) and deterioration of physical properties are usually caused by chemical changes: Tracking polymers via Fourier transform infrared spectroscopy (FTIR) the chemical changes can promote the study of the correlation between different aging methods and help establish the relationship between chemical structure, aging conditions and physical and mechanical properties:

association:

Methods for evaluating photoaging properties of plastic polymers Fourier transform infrared spectroscopy and UV/visible spectroscopy

## 1 Scope

This document specifies a method for the laboratory assessment of accelerated climate aging of polymers based on infrared spectroscopy (IR) and ultraviolet/visible spectroscopy (UV/Vis):

Chemical and outdoor exposure aging methods and processes:

This document is mainly applicable to photoaging, but can also be used for thermal aging:

## 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:

GB/T 1844.1 Plastic symbols and abbreviations Part 1: Basic polymers and their characteristic properties

## 3 Terms, definitions and abbreviations

### 3.1

Terms and definitions the following terms and definitions apply to this document:

#### 3.1.1

photoaging

Light radiation causes irreversible physical and chemical change processes within the material:

**NOTE:** These processes are affected by heat, oxygen and water:

#### 3.1.2

Exposure of materials in laboratory weathering equipment: Compared to outdoor or use environment exposure conditions, the exposure conditions may be cyclic of and strengthened:

Note 1 to entry: This exposure condition includes laboratory radiation sources, heat and moisture (which may be in the form of relative humidity and/or water spray, condensation or infiltration) to more rapidly produce household effects:

The same changes under external exposure conditions:

**Note 2:** This equipment includes means to control and/or monitor light sources and other aging conditions, and also includes special exposure conditions, such as those used to simulate the acidity of industrial gases:

Spray etc:

#### 3.1.3

Exposure of materials to solar radiation in outdoor climate conditions:

#### 3.1.4

absorptionspectrumabsorptionspectrum Incident electromagnetic radiation absorbed by materials or molecules within a certain frequency range: