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# NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

# GB/T 46019.2-2025

## Plastics - Identification of recycled plastics - Part 2: Polypropylene (PP) materials

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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 for standardization documents" Drafting.

This document is Part 2 of GB/T 46019 "Plastics - Identification of Recycled Plastics Content". GB/T 46019 has been published in the following parts.

- Part 1: Polyethylene terephthalate (PET) material;

- Part 2: Polypropylene (PP) material.

Please note that some of the contents of this document may involve patents. The issuing organization of this document does not assume the responsibility for identifying patents.

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

This document is under the jurisdiction of the National Technical Committee on Plastics Standardization (SAC/TC15).

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## Introduction

Building a waste recycling system is a key step in China's implementation of a comprehensive conservation strategy, ensuring national resource security, and actively and steadily promoting carbon peak and carbon neutrality.

The recycling and reuse of post-consumer plastics is an important part of waste recycling.

Part, not only can reduce resource waste and environmental pollution, but also effectively reduce carbon emissions, is an important part of promoting the green and efficient

development of the plastics industry Polypropylene (PP) is a thermoplastic widely used in packaging, automobiles, home appliances and other fields. Its efficient recycling of post-consumer waste Recycling and reuse are of great significance for promoting resource circulation and promoting the green and efficient development of the plastics industry.

Plastic materials may introduce various impurities during use, disposal and recycling. However, unlike chemical recycling, mechanical recycling is difficult to Completely remove impurities from post-consumer plastics. Therefore, mechanically recycled PP (also known as PP (REC)) is similar to the original PP in terms of volatile component characteristics.

By analyzing the volatile components in PP materials, typical characteristic volatile components can be screened out.

The results provide a basis for the identification of virgin and recycled PP.

This document is based on the analysis of volatile components in virgin PP and recycled PP samples using headspace gas chromatography-mass spectrometry (HS-GC-MS) technology.

The typical volatile components were screened out by analysis and the random forest classification model was combined to give the predicted value of the regeneration PP probability, so as to achieve the prediction of whether the sample is No, it is identification of post-consumer mechanically recycled PP.

To ensure the scientificity and reliability of the detection method, this document combines the current relevant standards to clarify the sample preparation method, instrument reference conditions, The standardized process of software and data processing, as well as the specific steps of model construction and evaluation, aims to provide a systematic, repeatable and Traceable technical guidance helps to efficiently recycle plastic waste.

GB/T 46019 "Plastics - Identification of Recycled Plastics Components" is intended to consist of three parts.

- Part 1: Polyethylene terephthalate (PET) materials. The purpose is to establish a method for identifying recycled PET materials.

- Part 2: Polypropylene (PP) materials. The purpose is to establish a method for identifying recycled PP materials.

- Part 3: Polyethylene (PE) materials. The purpose is to establish a method for identifying recycled PE materials.

Identification of recycled plastic components Part 2: Polypropylene (PP) materials

## 1 Scope

This document describes the determination of volatile components of polypropylene (PP)

materials using headspace gas chromatography-mass spectrometry, using a random forest algorithm.

A method to construct a predictive model to distinguish post-consumer mechanically recycled PP plastic materials from virgin PP plastic materials.

This document applies to pellets made from post-consumer PP through processes such as crushing, screening, classification, cleaning, and melt extrusion granulation.

Identification of PP recycled plastic materials.

This document is not applicable to the identification of recycled PP plastic materials obtained through chemical recycling.



## 2 Normative references

GB/T 2035

GB/T 30102

GB/T 40006.1

GB/T 41867

GB/T 45090

## 3 Terms and Definitions

The following terms and definitions are defined in GB/T 2035, GB/T 30102, GB/T 40006.1, GB/T 45090 and GB/T 41867.

The definitions apply to this document.

### 3.1 post-consumer plastic

Plastics generated by end users that have fulfilled their intended use or are no longer usable (including plastics returned from circulation).

[Source. GB/T 30102-2024, 3.3, modified]

### 3.2 Random Forest Model randomforestmodel

A machine learning method that performs classification or regression by building multiple decision trees and aggregating their predictions.

### 3.3 Gini impurity

An indicator to measure the purity of a dataset, that is, the probability that two samples randomly selected from the dataset belong to different categories.