Application Note POLYMER020

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POLYMER020: Evolved Gas Analysis during Chemical Recycling of PET by TG-MS

Introduction

In the chemical recycling of polymers, many processes are designed with insufficient knowledge of the progress of degradation reactions and product gases, which can affect the efficiency of recycling. Conventional thermogravimetry (TG) only shows weight changes and does not provide information on product gases, whereas TG-MS can detect gas components generated during heating in real time, thereby increasing process certainty, managing by-products, and reviewing reaction conditions.

Thermal analysis

Analysis:	Recycled materials
Use:	Process control, quality assurance
Analyzed materials:	PET (Polyethylene terephthalate)

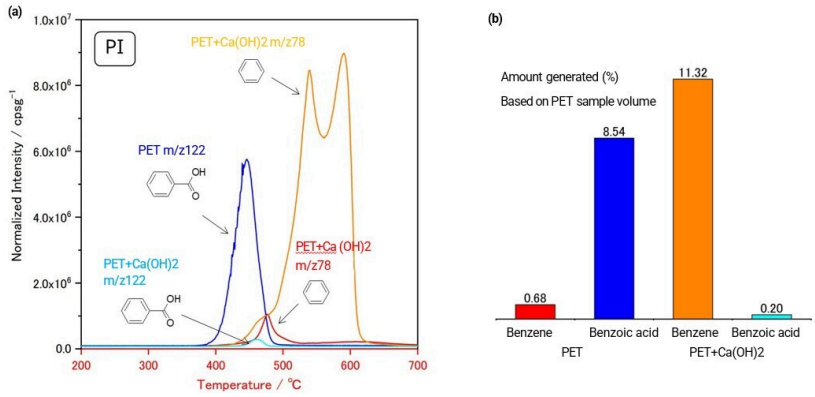

Figure 1: (a) Temperature profile of MS signal during PET decomposition compared to (b) quantified value of evolved gas

Conclusion

In the decomposition of PET alone, benzoic acid was the main product, and benzene production was negligible. However, the addition of calcium hydroxide reversed this trend and significantly increased the amount of benzene produced. This result indicates that the decomposition conditions have a significant impact on the type and amount of gases produced, suggesting that the control of byproducts is directly related to recycling quality and environmental safety.

Related products

STA/GC-MS

A thermal analysis device capable of highly sensitive simult aneous measurement of chemical reaction information that is difficult to determine with thermal analysis alone.