Application Note POLYMER010

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POLYMER010: Evaluation of High-Heat-Resistant Resins by Thermogravimetry, Optical Imaging, and Evolved Gas Analysis

Introduction

For engineering plastics and super engineering plastics that boast high heat resistance and high strength, it is essential to evaluate their thermal stability in actual use environments. Since decomposition and appearance changes due to heating can affect product reliability and safety, thermal behavior must be observed from multiple perspectives. By using TG-MS equipped with a sample observation function, it is possible to simultaneously check decomposition behavior, color and shape changes, and gas emission behavior during heating and obtain the quantitative and visual information necessary for material selection and design decisions.

Thermal analysis

Analysis:	Raw materials and parts products
Use:	Process control, failure analysis, quality assurance
Analyzed materials:	Polyetheretherketone (PEEK)

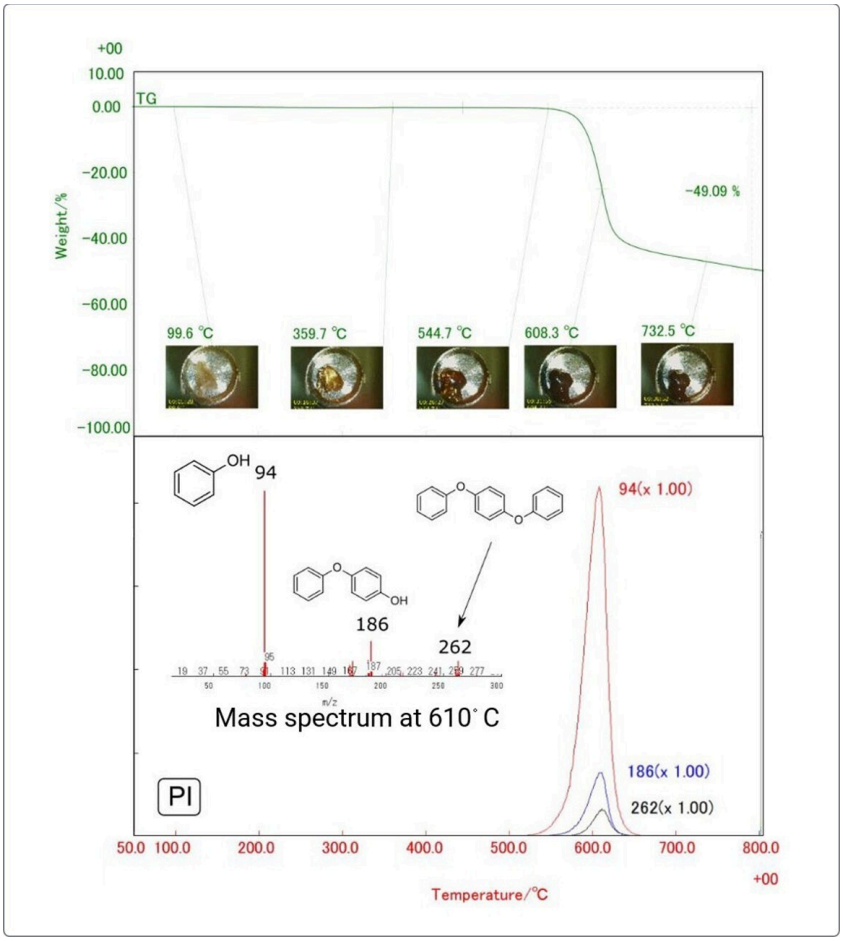

Figure 1: Sample observation TG-MS analysis result of PEEK

Conclusion

Heating of PEEK results in weight loss beginning at 500°C, with approximately 50% loss observed by 800°C. Observed images show little change up to 300°C, melting and increasing fluidity at 330°C, and further carbonization at temperatures above 500°C. It was also confirmed that phenol and other decomposition gases were evolved during mass loss. Thus, by simultaneously monitoring not only mass change but also appearance and gas behavior, early signs of decomposition and critical points for safety design can be captured without missing anything.

Related products

STA-GCMS

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