

P11-65. Improvement of TG Resolution by Heating Rate Conversion Simulation Method

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Thermogravimetry (TG) is widely used for the quantitative analysis of polymer materials thermal resistance test and of the polymer blend components. However, each mass change may not be measured accurately due to the reactions occur at similar temperatures while separated determination is performed for blended materials by TG. In this case, TG resolution improvement method using low heating rate measurement or CRTA (Controlled-Rate Thermal Analysis) is applied; however, there is an issue of decreased measurement efficiency due to the longer measurement time.

As a solution of this problem, Heating Rate Conversion Simulation Method is proposed [1]. This method calculates the activation energy ΔE of each reaction with regard to the decomposition reactions from TG measurement results, performs time-temperature conversion using calculated ΔE , and converts to low heating rate measurement data. TG resolution can be improved by this method.

In this study, the analysis result of the cotton-polyester blended yarn blending ratio is reported as an analytical example using the Heating Rate Conversion Simulation Method. Evaluation of the ratio of cotton and polyester components was not possible from TG raw data. However after the conversion this TG raw data to the slower heating rate measurement data by the Heating Rate Conversion Simulation Method, accurate blending ratio for cotton and polyester is obtained.

Reference

[1] R. Kinoshita, R. Nakatani, Y. Ichimura and N. Nakamura, The 34th Japanese Conference on Calorimetry and Thermal Analysis, 1B1020 (1998).