

Kinetics of Interchange Reaction in PET/PBT Blend System

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Intermolecular interchange reactions in poly(ethylene terephthalate) (PET)/poly(butylene terephthalate)(PBT) blend system at elevated temperatures were investigated. The sequence structures of the interchange-reacted blends were analyzed by proton and carbon-13 nuclear magnetic resonance spectroscopies, and the rates of interchange reactions between PET and PBT were determined from the analytical data of the sequence structures. With β parameter, which was expressed in terms of number-average molecular weights and initial mole fractions of homopolymers, the equation for the kinetics of interchange reaction by alcoholysis reaction mechanism was derived. The catalyzed interchange reaction between PET and PBT was rapid in the early stage of the reaction and it slowed down in further reaction. Dibutyltin dilaurate was more effective catalyst for the interchange reaction than titanium tetrabutoxide. It was estimated that the thermal degradations of the homopolymers and the heterolinkages of PET-PBT had an important effect on the reduction of the rates of interchange reaction at prolonged reaction times. The equation for the kinetics of ester-ester interchange reaction corrected with respect to the thermal scission of heterolinkage was well fit to the experimental results.