

Formation Reaction of PET prepolymer
from BHET or its Oligomer

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Oligomer, which was obtained via the glycolysis depolymerization of poly(ethylene terephthalate) prepolymer, and bis(β -hydroxyethyl) terephthalate (BHET) were esterified by addition of terephthalic acid (TPA) at 250 °C under atmosphere pressure. $\text{Sn}(\text{CH}_3\text{COO})_2$ and p-toluene sulfonic acid were used as metal and acid catalysts, respectively. The effects of the amount of catalyst and the mole ratio of glycolyzed oligomer and BHET to TPA on the reaction rate were examined. Change of linear oligomer composition and carboxyl content of reaction product were also analyzed by HPLC and titration method.

The esterification reaction of BHET and glycolyzed oligomer with TPA in the absence of acid catalyst was well fitted to second order rate equation expressed with moles of the reactants as parameters, and the reaction rate of glycolyzed oligomer was found to be faster than that of BHET. As mole ratio of BHET to TPA increased, the rate of esterification reaction increased. Enhancing of the reaction rate of p-toluene sulfonic acid was greater than that of Sn catalyst, and most preferable concentration of p-toluene sulfonic acid was determined.