

A Study on Preparation of Polybutylene Terephthalate

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In the process that uses terephthalic acid (TPA) and 1,4-butandiol(BD) for the production of polybutylene terephthalate(PBT), the influences of reaction conditions on % reaction, \bar{X}_n (the degree of polymerization of oligo-PBT), and %BD \rightarrow THF(tetrahydrofuran) were investigated.

With increasing mole ratio of BD : TPA, % BD \rightarrow THF increased and \bar{X}_n decreased, but with increasing tetrabutyltitanate (TBT) concentration, % BD \rightarrow THF decreased and \bar{X}_n increased.

% BD \rightarrow THF increased greatly with increasing the reaction temperature in the range of temperature between 210°C and 230°C and the increase of temperature afforded great effect to \bar{X}_n in the range of temperature up to 210°C.

Drop-wise feed of BD was an effective method for the minimization of THF formation.

Assuming that the reactions occurring in both the formation of oligo-PBT from BD / TPA and of THF from BD would be of the first order with respect to H₂O and THF respectively, the kinetic reaction constants— K_{H_2O} and K_{THF} —were determined from the results which had been examined in the temperature range between 190°C and 210°C.

H_{H_2O}/K_{THF} values were plotted versus the reaction temperature, and the temperature-raising-condition on reaction time for minimal loss of BD by hydration to THF was described.