

Thermal Properties of Segmented Block Copolyetheresters Based on Poly(butylene terephthalate) and Poly(tetramethylene ether glycol). 1

- Effect of Crystallization Condition -

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Segmented copolyetheresters based on poly(butylene terephthalate) and poly(tetramethylene ether glycol) with various hard segment contents were synthesized. The number average molecular weights of poly(tetramethylene ether glycol)(PTMG) used were 650, 1000, and 2000. The average segment length of hard and soft segment were calculated with the assumptions that polymerization was carried out to high extent of reaction and that the segment length distribution followed a most probable distribution.

The melting temperatures, crystallization temperatures and the heats of fusion were determined by differential scanning calorimetry for dynamically crystallized samples. The melting temperature of copolyetheresters was found to be a function of hard segment lengths. At the same hard segment content the overall crystallinity X_c increased with decreasing the soft segment length.

The effect of dynamic crystallization condition on the phase structure with respect to hard segment length and hard segment contents was examined at cooling rates of 3, 7, 20, and 50°C/min. When PTMG 2000 was used, the samples crystallized at 20°C/min cooling rate always had lowest crystallinity. On the contrary, for PTMG 650 system, samples crystallized at the same cooling rate showed highest crystallinity. In case of PTMG 1000, the samples containing 80, 65 wt% of hard segment showed same X_c behavior as the samples of PTMG 2000 system. On the other hand the samples whose hard segment contents were smaller than 50 wt% showed same X_c behavior as the samples of PTMG 650 system. These results showed that crystallization under dynamic crystallization process depend not only on the crystallizable hard block lengths but also on the non-crystallizable soft block lengths.