

Interchange Reaction between Chlorohydroquinone Diacetate, Terephthalic Acid, and PET and Thermal Properties of the Produced Copolyester

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A series of copoly(ethylene terephthalate/chloro-1,4-phenylene terephthalate) were prepared by the ester interchange and acidolysis reactions of poly(ethylene terephthalate)(PET) with chlorohydroquinone diacetate (CHQDA) and terephthalic acid(TPA) and by the condensation reaction between the acetyl and carboxyl groups.

The reaction proceeded at two stages. An initial cleavage of the polyester with TPA was followed by the polymerization of acid- and acetyl-terminated products. It has been confirmed by optical texture test, density and thermal analyses that the copolyester has a nematic liquid crystal structure. It was suggested from nuclear magnetic resonance study that chlorohydroquinone units from CHQDA has a random distribution in the copolyester. The sequence length of chloro-1,4-phenylene terephthaloyl (CHQ-TPA) units in the copolyester was calculated to be ca. 2, and it was considered that CHQ-TPA sequence is composed of 4 - 5 sequential aromatic rings. The copolyester from above 60 mole % of CHQDA had glass transition, crystal transition, and melting temperatures, but nematic transition temperature was not found because of thermal decomposition at that temperature. However, the transition temperatures of poly(chloro-1,4-phenylene terephthalate) were 219°C for glass transition, 295°C for crystal transition, and 352°C for melting, respectively. Crystallization induced reaction did not proceed for CHQ/PET(50/50) copolyester annealed for 40 hrs. at 220°C.