

Effect of hard segment content on the mechanical properties of the polyurethane film prepared from polycarbonate-diol based polyurethane dispersion

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Polyurethane dispersions (PUDs) were prepared using polycarbonate-diols, HMDI and DMFA with DBTDL catalyst. The PUDs were synthesized by prepolymer mixing process and then finely dried to make the PU films. In order to clarify how the mechanical properties of the PU films are influenced by the length of soft-segment and the relative amount of hard-segment, we synthesized the PUDs using three different polycarbonate-diols, whose molecular weight were 495, 1085 and 2028. The ratio of hard segment to soft segment of the PU films was further modulated by using two types of chain extender, 1,4-butanediol and ethylene diamine. Using FT-IR analysis, we performed the semi-quantitative analysis of urea, urethane, methylene, and carbonate groups in the PU films. AFM results indicated that the contents were hard segment and soft segment of the PU films. The effect of the molar length of polycarbonate-diols and the NCO/OH ratio on the mechanical properties of the PU films were characterized using UTM measurement.