

Effect of the polyol type and NCO/OH ratio on the mechanical properties of polyurethane film

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We prepared waterborne polyurethane dispersions(PUDs) with 4,4'-methylenebis(cyclohexyl isocyanate), dimethylol propionic acid, and the polyols which have different type of linkage groups. Dibutyltin dilaurate was used as a catalyst. The PUDs were synthesized by the conventional acetone process and then finely dried to make the PU films. To find the effect of a linkage-type of PUD soft-segment on the PU mechanical properties, poly(1,4-butylene adipate), poly(tetrahydrofuran), and polycarbonate diol, which has ester-, ether-, and carbonate-linkage in the each polyol backbone structure, were used. The ratio of hard-segment to soft-segment of the PUDs was controlled by using two types of chain extender, 1,4-butanediol and ethylene diamine. The contents of urea, urethane, methylene, and carbonate group in the PU films were analyzed in semi-quantitative manner from the FT-IR data. The effect of the polyol type and the NCO/OH ratio on the mechanical properties of the PU films were characterized using UTM measurement.