

Thermal properties of waterborne polyurethane dispersions treated with organo-clays and ammonium polyphosphate

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Organo-clays and ammonium polyphosphate (APP) were introduced into the prepolymer of waterborne polyurethane dispersions (PUDs) during the preparing the prepolymers to enhance the thermal stability and fire resistance of the PUDs, which were prepared using 4,4'-methylenebis(cyclohexyl isocyanate), polycarbonate-diol, and 2,2-Bis(hydroxymethyl)propionic acid. Through the ordinary neutralization, water dispersion, chain extension of the prepolymers, and solvent removing, the PUDs treated with organo-clays and APP were obtained. The extent of the reaction and quantitative analysis of the urea and urethane groups of the polyurethanes were confirmed using wet chemistry method and FT-IR. The degree of the organo-clays dispersion in the prepolymer and polyurethane composites was studied with XRD patterns. The particle size and surface roughness of the PUDs were measured by DLS and AFM. The thermal properties and stability of the PUDs were characterized using DSC and TGA.