

A THERMO-RHEOLOGICAL STUDY ON PHASE TRANSITIONS OF HARD AND SOFT THERMOPLASTIC POLYURETHANES

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Thermoplastic polyurethanes (TPUs) have a complex rheological behavior which is not well understood yet. In this work four commercial TPUs are investigated: two of them consist solely of isocyanate hard segments with diol chain extenders and the other two consist of hard segments of isocyanate with diol chain extenders and soft segments of diester with diol. The phase transitions were studied using shear and extensional rheology, differential scanning calorimetry (DSC) and Fourier transform infrared spectroscopy (FTIR), with the rheological and thermal properties being measured during heating and cooling sweeps. The results indicate that the rheological response is more sensitive to the phase transitions than the thermal response, with the loss tangent and extensional viscosity being particularly good at differentiating between the structural evolutions of the soft and the hard TPUs.