

Abstract

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Effect of ammonium and aminosilane montmorillonites organo-clayson the curing kinetics of unsaturated polyester (UP) resin nanocomposites.

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Abstract:

The curing kinetics of UP nanocomposites prepared by incorporating different amounts of two kinds of organo-montmorillonite (organo-MMT): trimethyloctadecylammonium chloride (TMOA) and aminopropyltriethoxysilane (APTES) were studied by non-isothermal differential scanning calorimetry (DSC) experiments. Small angle X-ray scattering (SAXS) was used for measuring the d-spacings in the modified organo-clays, and no intercalation of UP into these clays was observed for the nanocomposites. HRTEM images showed dispersed and agglomerated platelets in UP/APTES 2 and 10 wt%. DSC analysis showed two peaks in UP resins and UP/organo-MMT, and a decrease in the exothermal peak temperature (T_{p1} and T_{p2}) for nanocomposites with the heating rate as compared with those of neat UP system; thus, the higher the heating rate, the higher the curing reaction rate. This effect was more clearly observed on the UP/MMT-APTES nanocomposites. The effective activation energies (E_a) were determined with the model-free isoconversional Starik's method. The Sesták-Berggren model was chosen to simulate the reaction rate with a good match achieved. Thermal gravimetric analysis showed that the cured UP/APTES at high concentration were slightly more stable than UP and TMOA.

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Biography:

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