

Effects of elevated temperatures on the compression strength of nanoclay filled unsaturated polyester resin

Abstract

The paper describes the effects of the montmorillonite (MMT) fillers commonly known as nanoclay, on the compression properties of unsaturated polyester resins at different weight percentage of nanoclay. Modified resin specimens with 1, 3 and 5 wt. % of nanoclay contents were prepared and subjected to compressive tests according to ASTM D695. The static uniaxial compression testing were conducted at various temperatures ranging from room temperature (RT) to the temperature closer to its glass transition temperature T_g to study the effect of nanoclay fillers on the compressive stress-strain behaviour at high temperatures (room temperature, 35, 45, and 75°C). The mechanical properties of the nanomodified resin including the elastic modulus, maximum stress and failure strain were determined. The experimental results imply that adding these nanoclay fillers has enhanced the elastic modulus, compressive strength, and toughness without sacrificing the strain to failure and thermal stability of the unsaturated polyester. However it was found that generally, all specimens showed degradation in compressive strength with increases in temperatures.

Keywords — Compressive properties, nanoclay, unsaturated polyester resin, temperature; mechanical testing, stress-strain response