

Physical and morphological properties of nanoclay in low molecular weight phenol formaldehyde resin by ultrasonication

ABSTRACT

The aim of the present study was to examine the characteristics and physical properties of a low molecular weight phenol formaldehyde resin (LmwPF, mw approximately 600) and modified nanoclay admixture. LmwPF resins (45% w/v) were combined separately with 0.5%, 1.0% and 1.5% w/w montmorillonite nanoclay nanomer (based on solid PF). Each of the solutions was ultrasonicated in a sonifier. The dispersion of nanoclay in LmwPF was examined using X-ray diffraction (XRD), and Transmission Electron Microscopy (TEM). It was found that ultrasonication in a sonifier at 50 kHz for 60 min was able to disperse modified nanoclay up to 1.5% into the resin. XRD and TEM analyses showed that the nanoclay dispersion in the resin were either intercalated or exfoliated. The results also showed that the presence of nanoclay in the admixture significantly increased non-volatile content and reduced gelation time and pH values.

Keyword: A. Phenolic; A. Nanofillers; B. Morphology; C. Microscopy; C. Structure property relation