

Grafting of sodium carboxymethylcellulose (CMC) with glycidyl methacrylate and development of UV curable coatings from CMC-g-GMA induced by cationic photoinitiators

Abstract

With a view to developing UV curable surface coatings from renewable raw materials, carboxy methyl cellulose (CMC), one of the well-known cellulose derivatives, was subjected to a grafting reaction to introduce photoreactive epoxide groups onto the cellulose chain. Glycidyl methacrylate (GMA) was chosen and grafted onto the sodium carboxymethyl cellulose (SCMC) polymer chain using ceric ammonium nitrate (CAN) as initiator in a homogenous reaction system. Acrylate groups were involved in the grafting reaction while the glycidyl groups remained as pendant groups for a subsequent reaction induced by cationic photoinitiators and UV light. The percentage of grafting was found to increase with the increase of GMA monomer concentration within the range studied. FTIR spectra analysis provided evidence of grafting and a mechanism for the grafting reaction has been suggested. CMC was found to become hydrophobic on account of grafting and to account for such a transformation a spherical core-shell configuration has been proposed for the grafted polymer. CMC-g-GMA in cycloaliphatic diepoxied (CAE) system was found to exhibit pseudoplastic behaviour with a hysteresis suggestive of thixotropy, a property favourable to surface coatings. The cure behaviour and mechanical properties of the cured films were studied and these results are reported in this paper.

Keywords — CMC-g-GMA, grafting, photoinitiator