

Synthesis and characterization of palm-based resin for UV coating

ABSTRACT

The production of UV curable acrylated polyol ester prepolymer from palm oil and its downstream products offer potential and promising materials for applications such as polymeric film preparation and coatings. In this study, palm olein polyol was reacted with acrylic acid in the presence of a catalyst and inhibitors via condensation esterification process. The reaction temperature of 80C and the stirring rate of 400 rpm produce a homogeneous product. Based on iodine value result, the suitable amount of p-toluene sulfonic acid monohydrate used as catalyst was 3.0% (w/w) of palm olein polyol. Different UV curable formulations have been investigated using the synthesized prepolymers with monomers and a small amount of photoinitiator. Monomers used were 1,6-hexanediol diacrylate (HDDA) and trimethylolpropane triacrylate(TMPTA) while photoinitiator used was 1-hydroxy cyclohexyl phenylketone (Irgacure 184). The mixtures were cured to make thin polymeric films under UV radiation with doses between 2 and 14 passes (energy per pass is 0.6 J/cm²). Coating and curing was carried out on glass for pendulum hardness and FTIR analysis. Pendulum hardness of the film prepared using monomer HDDA and the prepolymer previously synthesized using 3.0% catalyst was 24.5%. The radiation dose needed was 14 passes. The highest pendulum hardness of 49.4% was achieved using monomer TMPTA and the prepolymer synthesized using 2.0% catalyst. The radiation dose needed was 10 passes.

Keyword: Palm-based resin; Prepolymer; UV coating