

Palm oil based water-resistant coating using pre-polymer method

ABSTRACT

The paper presents some results on the ability of palm oil polyol to replace the petroleum-based polyol in polyurethane (PU) synthesis. In this study, palm oil polyol with amine functionality with hydroxyl value (OH value) between 240 - 253 mg KOH/g was used as the polyol component to replace the conventional petroleum-based polyol. Four different formulations of polyurethane coating have been prepared using pre-polymer process namely PU1, PU2, PU3 and PU4 with the polyol to isophorone diisocyanate ratio (OH:NCO) of 1:0.6 and 1:0.5 and acetone within 25-50 wt %. PU1 (1:0.6) and PU2 (1:0.5) result in brittle film, while PU3 (1:0.6) and PU4 (1:0.5) has a soft and flexible film with better transparency. This finding establishes that the acetone content effect the final properties of the polyurethane formed. The polymerization reaction was monitored using the fourier transform infra-red spectroscopy and it was found that the peak corresponds to NH (3302 cm^{-1}), CO (1627 cm^{-1}) and CN (1543 cm^{-1}) stretching of urethane linkage appearing in all the PU films. The water uptake test was done on the films and it was found that the percentage of water uptake is less than 5% within 24 hours of immersion. The surface morphology of the PU films shows that homogeneity was achieved in 1:0.6 of OH:NCO ratio with 25 wt% of acetone. The PU films have the potential to be developed for water resistant coating.