Graft copolymerization of butyl acrylate/methyl methacrylate onto waterborne polyurethane from blend formulation with hydroxyl telechelic natural rubber and modified rubber seed oil

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Abstract: Novel anionic waterborne polyurethanes (aWPU) was successfully prepared by the prepolymer process from the bio-renewable sources, hydroxyletechelic natural rubber (HTNR) and hydroxylated rubber seed oil (HRSO), with dimethylol propionic acid (DMPA) fixed content at 5.6 wt%. Then aWPU (70% aWPU) was grafted copolymerization of mixed between butyl acrylate (Bu-ac) and methyl methacrylate (MMA) monomer in the weight ratio 60:40 (30 wt% Bu-ac/MMA) by using potassium persulfate as an initiator and sodium dodecyl sulfate (SDS) as a surfactant. The effect of amount of SDS and initiator on the grafting efficiency and conversion were investigated. It was found that the amount SDS at 2 and 3% weight provided well dispersion, however SDS was able to migrate on surface of films. In addition, 2% of potassium persulfate in SDS free system gave an optimum conversion. FT-IR technique confirmed that the Bu-ac/MMA monomer was successfully grafted onto aWPU. The novel green bio-based aWPU grafted vinyl monomer has a potential to apply in adhesive material for leather industries.

Keywords: Waterborne polyurethane; Rubber seed oil; Natural rubber; Graft copolymerization