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Synthesis and characterization of polyurethane–organoclay nanocomposites based on renewable castor oil polyols

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Abstract In this study, castor oil-based polyurethanes–organoclay (COPUs-Cloisite 30B) nanocomposites are synthesized by mixing polypropylene glycol polyol and dehydrated castor oil (15 %), enforced with C30B nanofillers, at different weight percentages. The physico-chemical behaviors were evaluated by Fourier transform infrared spectroscopy, Fourier scanning electron microscopy, scanning electron microscopy and X-ray diffraction. Thermal stability was found improved up to ~30 °C in the sample with 5 wt% of C30B. Tensile properties depicted an improvement of ~240 % in tensile strength and decrease of ~30 % in elongation with 5 wt% organoclay, respectively. Improved physico-chemical properties of COPUs-C30B signify the usage of COPUs-C30B in the industrial and commercial applications, i.e. coatings, adhesives and automotive applications.

Keywords Renewable polyols · Polypropylene glycol polyol · Castor oil · Cloisite 30B · Physico-chemical behaviors

Introduction

Polyurethanes (PUs) with distinctive physical and chemical properties are flexible, high mechanical, thermal [1–3] and chemical resistance polymers. PUs can be tailored to meet diversified demands of various applications such as rigid insulations, coatings, footwear adhesives [4], fibers, thermoplastic elastomers,

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