



Preliminary Study on the Preparation of Poly(D,L-Lactide/Propylene Glycol) Triblock and Cross-Linked Copolymers

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Abstract: This study aims to improve the properties of poly(D,L-lactide) (PDLLA) through copolymerization with poly(propylene glycol)(PPG) followed by cross-linking process. Cross-linked copolymer poly(D,L-lactide/propylene glycol) with strong and elastic properties was obtained in two steps. First step was the synthesis of PDLLA-PPG-PDLLA triblock copolymer via melt polymerization method. The second step was the cross-linking process where the triblock copolymers reacted with hexamethylenediisocyanate (HMDI) as chain extender and glycerol as cross-link agent. The formation of triblock copolymer was identified from the presence of a signal at 4.3 ppm in the ¹H NMR spectrum which belongs to the PDLLA repeating unit bonded to PPG block. Gas Permeation Chromatography indicated an increase in the number average molecular number (M_n) of PPG from 4000g/mol to 4600g/mol (PDI = 1.52). The cross-linked copolymer was identified using Fourier-Transform infrared spectroscopy. Absorption at 1690cm^{-1} indicates the presence of urethane carbonyl group and supported the existence of urethane links. The product was also characterized by Scanning Electron Microscope (SEM). SEM micrograph showed that the cross-linked copolymer contains macro pores, which is typical from reaction employing glycerol as the cross-linking agent.

Keywords: Cross-link; poly(D,L-lactide); poly(propylene glycol); triblock copolymer.

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