UNIVERSITI TEKNOLOGI MARA

POLYMERIZATION ON THE LACTIDE TO PLA THE EFFECT OF LACTIDE CONCENTRATION

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ABSTRACT

Polylactide was synthesized via ring –opening polymerization of lactide. The ring opening polymerization of lactide usually used the homogenous catalyst for the process polymerization of the lactide. But, for the polymerization process used the homogenous catalyst need the complex separation process in liquid-liquid component. Then, the heterogeneous catalyst need to use so the process of separation of PLA more easy. The tin octoace was used as the catalyst for this experiment. The aim of this experiment to study the polymerization of lactide with the heterogeneous catalyst. The properties of PLA were studied as a function of the concentration of lactide (0.5M, 0.3 and 0.1M) relative to the synthesis of PLA. The PLA were characterize by uv-visible spectroscopy (UV-vis) and Fourier transform infrared spectroscopy (FT-IR). The UV-vis showed the wavelength 233 nm of the PLA in the solution with different absorbance. FT-IR spectra showed the different between PLA and the lactide.

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INTRODUCTION TO RESEARCH

1.1 Title of Research

Polymerization on the lactide to PLA the effect of lactide concentration.

1.2 Research Background

Polylactide(PLA), which is the one of the most significant biocompatible polyesters that are derived from annually renewable biomass such as corn and sugar beets. There four advantages of the polylactide such as renewability, biocompatibility, processability and energy saving(Rasal, Janorkar, & Hirt, 2010). PLA is inexpensive , dimensionally stable and harder compare polytertafluorocthylene (PTFE) (Pawar, Tekale, Shisodia, Totre, & Domb, 2014). The used of PLA and its polymeric in medical field such orthopedics, drug carriers, facial fracture repair, tissue engineering, antimicrobial agents, antitumor, ureteral stens, biomaterials and miscellaneous application. PLA used in medical field because eco-friendly biopolymer for use in the human body.

Lactide is the ring-formed dimer of lactic acid. Lactide used in manufacturing of high molar mass PLA in the ring-opening polymerization (ROP).and also important in intermediate in industrial production of PLA. Lactide be existent in a few different forms: L,L-lactide, D,D-lactide, and D,L-lactide. A 50:50 mixture of L,L- and D,D-lactide is referred to as racemiclactide (Hong, Kim, Seo, & Han, 2012). The depolymedrization process can produce end-product which is lactide. The quality of the polymer used as reagent also effect the properties of the crude lactide in the depolymerization reaction parameter. Furthermore to lactide, the crude product also contain water, lactic acid, lactic acid oligomer and also residual catalyst.

There are two type of process for manufacturing PLA, ring-opening polymerization of lactide and polycondensation of lactic acid. For the polycondensation more to the traditional, that process requires high temperature, long time reaction and a continuous