



EFFECT OF REACTION CONDITIONS ON THE MOLECULAR WEIGHT OF HYDROXYLATED LACTIC ACID-BASED PREPOLYMERS (PLA-OH)

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Low molecular weight lactic acid-based prepolymers containing OH groups at chain ends (PLA-OH) were synthesized via condensation polymerization of L-lactic acid (LA) using stannous octoate as catalyst and 1,4-butane diol (BDO). The effect of three reaction parameters (reaction time, amount of catalyst based on LA, amount of BDO based on LA) on the molecular weight (MW) and molecular weight distribution (MWD) of PLA-OH have been investigated by the design of experiment (Response Surface, Box-Behnken method). Three levels for each parameter were selected (reaction time: 6, 8, and 10 hours; Catalyst: 0.05, 0.10, and 0.15 mol%; BDO: 2, 3, and 4 mol% based on LA). The results showed that if the reaction time increase, the molecular weight of prepolymers will reasonably increased. The molecular weight of PLA-OH polymers was also increased by decreasing the amount of catalyst. The results were also showed that adding more amount of BDO to the reaction mixture results in lowering the molecular weight of the prepolymers. Finally, using the design expert, an equation was extracted for the molecular weight of the prepolymers based on the reaction parameters including reaction time, catalyst amount, and BDO amount.