PRODUCTION OF POLYLACTIC ACID: A REVIEW

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ABSTRACT

Poly(lactic acid) is the biodegradable aliphatic polyester produced in small quantity and in large quantities industrially and used very variously. Because of its good mechanical property and reconcilability with environment, it is one of the polymers most appropriate to replace non-biodegradable synthetic polymers based on crude oil. The objective of this project is to choose the best process for the production of Polylactic acid (PLA). The objectives of this research are to analyze the type of process for the production of Polylactic Acid (PLA), to differentiate 3 types of process in term of performances and properties of Polylactic Acid (PLA) and to recommend the suitable process for the production of Polylactic Acid (PLA). A polymer which is Polylactic acid (PLA) is used as a material of studies. Production of PLA will be undergoing 3 types of process such as direct condensation polymerization, azeotropic dehydration condensation and ring-opening polymerization. The most suitable method will be selected and discussed further. The ring-opening polymerization are the most used techniques rather than the other methods. This paper reviewed methods of making PLA by using the ring-opening polymerization and mainly mechanism of ring-opening polymerization as well as its chemical structure and properties, mechanical properties and thermal properties. The best method to produce a high molecular weight of PLA is by using ring-opening polymerization process (ROP). Moreover, a good type of isomers such as L-lactide isomer could achieved a higher molecular weight of PLA and also a good thermal properties of PLA such as high glass transition temperature as well as high crystallization temperature. Moreover, due to a high crystallization and glass transition temperature could achieved a good mechanical and chemical structure for the production of a high molecular PLA.

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CHAPTER 1

INTRODUCTION

1.1 Reseach Background

Polylactic acid (PLA) is a one of a kind polymer that carries on from multiple points of view such as Polyethylene terephthalate (PET) which additionally plays out a ton like polypropylene (PP), a polyolefin. It also might be the polymer with the broadest scope of utilizations on account of its capacity to be stress solidified, thermally solidified, impact modified, filled, copolymerized and prepared in most polymer handling hardware. It can be produced into transparent films, strands or injection molded into blowmoldable preforms for containers, for example, PET. PLA likewise has fantastic organoleptic qualities and is superb for sustenance contact and related bundling applications.

PLA is not new to the world of polymers. Carothers (1932) examined the creation of PLA from the cyclic dimer (lactide) of lactic acid. Indeed, even before that, low atomic weight dimers