CHAPTER I
INTRODUCTION

Nowadays, plastic becomes a major product to be used for daily life. Although the plastic products are convenient and low cost, the fact that the product life cycle time is short resulting in tremendous litters everyday. Conventional techniques for minimizing plastic waste such as recycling and reclamation are proposed, however, the economically viability obstructs the implementation. Plastic disposal by landfilling occupies space due to their low weight-to-volume ratio. Moreover, most plastics can not be degraded even after decades because of their non-polar structure and high molecular weight. Incineration not only requires high energy but also produces toxic and corrosive gases. Currently, the oil and gas crisis has shown the instable raw material for downstream industries. It is estimated that the global resources of oil will be running out in 80 years, of natural gas in 70 years and of coal in 700 years (Grengross., 2000). According to this reason, the price of petroleum now is instable and tends to increase.

In response to these concerns and the growing of the environmental awareness, the ecologically friendly materials and renewable resource for their products have to be solved. The use of biodegradable polymer is the most possible sustainable solution. In the past few years, the development of petroleum based biodegradable plastics, especially PBS (poly(butylene succinate)) becomes a promoting material. Much effort to develop biodegradable plastics from renewable resources, especially starch or sugar, has also been put resulting in the technologies, such as poly(lactic acid) (PLA), poly(butylene succinate adipate) (PBSA), poly(butylene succinate) (PBS), poly(ε-caprolactone) (PCL), poly(β-hydroxybutyrate) (PHB), poly(ethylene oxide) (PEO), poly(propylene oxide) (PPO) and poly(glycolic acid) (PGA).

The leading countries on biodegradable polymers are USA, the European countries and Japan. As Thailand is rich in renewable resource, there are opportunities to develop its own technology to produce biodegradable polymers and the products. The area of biodegradable polymer covers the upstream and intermediate steps of fermenting starch to monomer and polymerizing monomer to polymer resin, and the downstream step of blending or mixing the resin with additives where the polymer resin is compounded. The present project focuses on the compounding of poly(lactic acid) (PLA) to satisfy the processing condition in producing PLA film for plastic bags following rules for positive list. The price of the compounded PLA obtained, which is not higher than 150 baht/kg, is also concerned. As the limitations for making PLA film are the amorphous structure and the brittleness, the reduction of glass transition temperature (T_g) with plasticizer and the nucleation with nucleating agent are the main points to be considered whereas the blending with additives is a requirement for compromising the product price.