CHAPTER V

CONCLUSIONS

The synthesis of PCL via the ring-opening polymerization of cyclic ∈-caprolactone initiated by triethylaluminum in either solvent or non-solvent system is suffered by the stability of the initiator, particularly, the reaction system containing oxidizing agents which can deactivate the initiator is found to be affected. The effect of initiator-deactivators such as oxygen and water on the polymerization is clearly seen in the case of the irregular relationship between the concentration ratio of monomer to initiator and the molecular weight of the obtained polymer. However, the polymerization initiated by this initiator can give linear poly(∈-caprolactone) with high molecular weight and high percentage yield. Furthermore, the stability of the initiator can also be controlled by using the efficient apparatus to prevent the oxidation of the initiator caused by the deactivators. Thus this synthesis is feasible for the polymerization of ∈-caprolactone.

The graft copolymerization of methylacrylate onto starch carried out in an aqueous system using Ce(IV) as an initiator is affected by many factors such as reaction volume, time-intervals for the addition of the initiator, amount of initiators, concentration of monomer, amount of nitric acid and temperature.

The varying of these factors can be done in order to get the required grafting parameters such as grafting yield, true grafting yield and grafting efficiency. The grafting copolymerization which is carried out under the optimum condition gives the graft copolymer with high percentage of grafted PMA. Since the copolymer containing high content of grafted side chains can be well blended with other synthetic polymers so the reaction which gives such a polymer is very useful.

The films of PCL, Starch-g-PMA, and their polymer blends such as PCL/PVC, PCL/PVAc, Starch-g- PMA/PVC and Starch-g-PMA /PVAc can support the growth of fungi. The films of PCL and Starch-g-PMA are the best sources of fungi's food since they can be degraded easily. The polymer blends of Starch-g-PMA can be degraded easier than that of PCL. However it is expected that the films or plastics made of these materials can be biodegraded in the natural environment as in the laboratory.

The future study of applications of PCL and Starch-g-PMA should be concentrated on the polymer processing which can give the products with good quality. The biodegradation of the final products must be examined again to make sure of products' quality. In addition, the nondegraded fragments which are remained in the surrounding after uses must also be investigated their affections on ecological system.