CHAPTER I

INTRODUCTION

Due to considerable attentions in preparation of biodegradable products based on natural polymers such as starch, many techniques have been developed in order to modify chemical and physical properties of those natural polymers. Extensive works have been reported for chemically attachments of synthetic polymers onto starch via free radical graft copolymerizations. The initiations of such reactions begin when free radicals generated on starch molecules react with vinyl monomers. Several methods have been used to generate these free radicals, and they can be divided into two categories: irradiation and chemical initiations.

Irradiation initiation has been very popular in these recent years. It has been applied to an enormous number of graft copolymerizations. Although, it seems to have many advantages, not only the ease to graft but also high grafting efficiency and good properties the resultant graft copolymers will have; however, irradiation is an expensive and dangerous technique. Consequently, the safety of controlling equipment and the pilot scale production have become the serious problems.

In addition to irradiation initiation, free radicals on starch backbone can be generated by chemical methods. Grafting of vinyl monomers onto starch has been accomplished by using various types of free radical initiators such as ceric ammonium nitrate, potassium persulfate, manganic pyrophosphate, potassium permanganate, and hydrogen peroxide-ascorbic acid system.

In this research, an alternative method using another type of initiator for synthesizing starch graft copolymer based on cassava starch and methyl methacrylate monomer is presented. Benzoyl peroxide (BPO) has been chosen to be used as an initiator for this method due to its low cost, its ease to handling and its safe polymerization system.

The characterization techniques used in this research include Fourier transform infrared spectroscopy (FT-IR), scanning electron microscopy (SEM), and gel permeation chromatography (GPC). These techniques are used to analyze the samples in term of chemical structures, morphologies, and molecular weight distributions. Furthermore, the grafting characteristics including homopolymer formation, grafting efficiency, grafting ratio, percent add-on, monomer conversion and yield are also calculated and used as the criteria to determine the optimum conditions for this graft copolymerization system.