CHAPTER I

INTRODUCTION

1.1 Introduction

Water soluble polymers have attracted increasing attention since the early 1970s because of their great utility in industrial applications(1). Preeminent among these is their ability to flocculate suspended solid, e.g. wastes in industrial and municipal effluents or pulp in papermaking. Other considerable applications are to aid in petroleum recovery, to reduce turbulent friction of water and as component of water based finishes developed in response to environmental constraints. Some attractive water soluble polymers have displayed biologic activity.

Water soluble polymers are normally made by aqueous bulk gel polymerization or by a reverse phase polymerization (2). The polymers made by any polymerization techniques have the specified properties depending on polymerization mechanism.

1.2 Objectives

The objectives of this research are the followings:

1.2.1 To investigate the foamed polymerization process for the synthesis of a water soluble polymer.

1.2.2 To analyse some kinetic informations of the foamed polymerization of a water soluble monomer.

1.3 Expected Benefits Obtainable for Future Developments of the Research

1.3.1 To apply the present informations for scaling up the synthesis of water soluble polymers by foamed polymerization process,

1.3.2 To apply the present informations for designing reactor suitable for the foamed polymerization process,

1.3.3 To develop an appropriate polymerization process for the synthesis of water soluble polymers or even not water soluble polymers using the foamed polymerization process.

1.4 Scope of the Investigation

Synthesis of water soluble polymers by the foamed polymerization process was first developed in 1990. Not known are the

informations about the polymerization mechanisms and kinetics in this process which determine reaction behavior and properties of polymer. Therefore, it necessary to investigate as follows:

1.4.1 Literature survey and profound study of this research work.

1.4.2 Preliminary studies

a) Synthesis and characterization of starch-g-poly acrylamide via the foamed polymerzation process.

b) Studies of degradation of starch backbone in the presence of alkali foaming agent.

c) Synthesis and characterization of polyacrylamide via the foamed polymerization process.

1.4.3 Kinetic analysis of the isothermal foamed polymerization of acrylamide by investigating the following:

a) Initial rate of polymerization.

b) Initial rate dependency on monomer concentration.

c) Initial rate dependency on initiator concentration.

d) The effect of polymerization temperature on initial rate.

1.4.4 Studies of thermal effects for the foamed polymerization of acrylamide by investigating the following:

a) Temperature profile during course of polymerization in the ampoule.

b) Conversion profile during course of polymerization in the ampoule.

c) The effect of reaction scale on temperature profile and conversion profile.

d) The effect of surface area/volume ratio of the ampoule on temperature profile and conversion profile.

e) The effect of reaction mass on temperature profile and conversion profile.

1.4.5 Summarization of the results and preparation of the thesis.