CHAPTER 1

INTRODUCTION

1.1 Introduction

Enzymes are protein molecules which serve to accelerate the chemical reactions of living cells (often by several orders of magnitude). Without enzymes, most biochemical reactions would be too slow to even carry out life processes. Enzymes display great specificity and are not permanently modified by their participation in reactions. Since they are not changed during the reactions, it is cost-effective to use them more than once. However, if the enzymes are in solution with the reactants and/or products it is difficult to separate them. Therefore, if they can be attached to the reactor in some way, they can be used again after the products have been removed. The term "immobilized" means unable to move or stationary. And that is exactly what an immobilized enzyme is: an enzyme that is physically attached to a solid support over which a substrate is passed and converted to product.

Enzymes can denature due to solvent effects and mechanical shear forces. Recovery of enzymes from reaction solutions and separation of the enzymes from substrates and products are in general very difficult. These problems can be successfully tackled by immobilization of the enzyme.

The main advantages of immobilized enzymes are:
• Easy separation from reaction mixture, providing the ability to control reaction times and minimize the enzymes lost in the product.

• Re-use of enzymes for many reaction cycles, lowering the total production cost of enzyme mediated reactions.

• Ability of enzymes to replace multiple standard chemical steps and provide enatomerically pure products.

1.2 Problem Statement

Enzymes are protein molecules which serve to accelerate the chemical reactions of living cells (often by several orders of magnitude). Without enzymes, most biochemical reactions would be too slow to even carry out life processes. Enzymes display great specificity and are not permanently modified by their participation in reactions. Since they are not changed during the reactions, it is cost-effective to use them more than once. However, if the enzymes are in solution with the reactants and/or products it is difficult to separate them. Therefore, if they can be attached to the reactor in some way, they can be used again after the products have been removed. The term "immobilized" means unable to move or stationary. And that is exactly what an immobilized enzyme is: an enzyme that is physically attached to a solid support over which a substrate is passed and converted to product.

1.3 Objective

The objective of this research is to study the immobilization of α-amylase (BAN) and in alginate beads for sago starch hydrolysis.
1.4 Scope

1. To study the immobilization of $\alpha$-amylase and amyloglucosidase for sago starch hydrolysis
2. To investigate the relationship between bead size and alginate concentration with alginate capsules
3. To optimize the capsule’s characteristic.