

CHAPTER I

INTRODUCTION

Membrane separations have played significant roles in many industries: such as food and beverage, dairy, water desalination, microelectronics, petrochemical, pulp, industrial waste treatments, biomedical processes, and etc.

There are many reasons for these applications. Firstly, membrane systems can effectively replace a number of costly separation technologies: such as distillation, cryogenics, pressure swing adsorption, etc., because membrane systems are of lower costs, less maintenance, and more flexible than other technologies. Secondly, membrane systems can improve final product quality. For example, in food concentration, membrane separation could produce a better tasting product because it is unnecessary to use the heat in evaporation processing. Finally, membranes can perform difficult separation better than other separation processes.[1] Recently, ceramic membranes are choices of interests to be used in many industries, due to its high chemical, mechanical stability, and easy cleaning.

α -amylase is an extracellular enzyme produced by microorganism in fermentation process. Commercially utilization of this enzyme is focus on starch

conversion to glucose. In α -amylase production process, ultrafiltration is recommendly used to concentrate and purify enzyme in low temperature range. By this technique, the problem of denaturalization of enzyme should be avoid.

From the work of Sittinun [2], he produced microfilter for microbial separation. This kind of filter should be developed to be ultrafiltration range which will be capable to concentrate enzyme.

For these reasons, the focus of this study was to produce ceramic ultrafilter for separation of α -amylase enzyme from solution.

Hence, the objectives and scopes of this study would be as follows:

1.1 The objectives of this study

- 1.1.1 To determine the best condition for producing ultrafiltration membrane by sol-gel method
- 1.1.2 To study the separation of α -amylase enzyme from solution by using home made ultrafilter

1.2 The scopes of this study

1.2.1 Use α -alumina as a membrane support

1.2.2 Study the best conditions for membrane production at various factor:

- acid concentration (range of 0.03 to 0.11 mole of acid)
- calcination temperature (range of 300 to 800 °C)
- calcination time (range of 5 minutes to 4 hours)

1.2.3 Characterize the properties of home made ultrafilter: ie, pore size, pore volume, porosity, and rejection.

1.2.4 Using home made ultrafilter to separate α -amylase enzyme from solution at various condition as follow:

- transmembrane pressures
- recirculation velocities
- α -amylase concentrations