CHAPTER I
INTRODUCTION

Recently, world is moving toward to fuel shortage problem while demand on using fuel is increasing continually. In order to develop the production of fuel to be sufficient, one interesting alternative is biofuel. Lignocellulosic biomass includes crop residues, grasses, wood, sawdust, wood chips, and solid animal waste can be used as feedstock to produce biofuels. Among agricultural products in Thailand, corn has become a popular alternative due to its abundance. Corn is composed of three major components: 45% cellulose, 35% hemicelluloses, and 15% lignin (Sun and Cheng, 2002). The highest production of corn in Thailand is approximately 5.4 million tons in 1985. Between 1960 and 1985, the productive tendency of corn in Thailand was rapidly increasing. Therefore, this leaves room for further increases productivity by using corncob waste as a feedstock for producing value-added product like bioethanol. Bioethanol is one type of biofuels, which can be used for blending with gasoline in order to decrease the amount of pollutants emitted from motor vehicles (Icoz *et al.*, 2009).

In order to produce bioethanol from corncob waste involves 4 steps: pretreatment, hydrolysis, fermentation, and ethanol separation. Pretreatment step is essential to remove lignin, seperate hemicelluloses, and improve enzymatic accessibility. After pretreatment process, cellulose will be less crystalline, allowing enzyme to hydrolyze it into fermentable sugars which mainly consist of six carbon sugar like glucose in hydrolysis step. After that, the hydrolysated cellulose and hemicellulose were fermented to ABE (acetone, butanol, and ethanol) by using an anaerobic bacterium in fermentation step. Then the products were taken to ethanol separation step.

Since biomass is a complex mixture of cellulose, hemicellulose, and lignin. Pretreatment is a necessary process in order to achieve high bioethanol yield. Various pretreatment technologies have been studied to improve structural and chemical of lignocellulosic biomass such as physical pretreatment, chemical pretreatment, biological pretreatment, and physico-chemico pretreatment. Anyway, this work focused on the chemical pretreatment with dilute acid. The aims of dilute acid pretreatment are changing structure and chemical composition of lignocellulosic biomass prior to the enzymatic hydrolysis. The corn cob is pretreated by dilute acid to modify the crystalline polysaccharides form to a more reactive amorphous form (Zheng *et al.*, 2009). In addition, dilute acid can solubilize hemicellulose and remain lignin and cellulose. The advantages of this step are enhancing the enzymatic digestibility of cellulose and significantly increasing value-added production yield (Hendriks and Zeeman, 2009).

The main objective of this study is to optimize the condition of dilute phosphoric acid pretreatment from corncob waste.