CHAPTER I
INTRODUCTION

Owing to being an agricultural country, Thailand produced approximately 70 million tons of sugarcane in 2007 and became the world third sugar producer following Brazil and Australia, respectively. Sugarcane bagasse consists of cellulose 40 %, hemicellulose 24 % and lignin 25% on a dry weight basis (Saha, 2003). It is an abundant source of lignocellulose that can be hydrolysed to yield fermentable sugars for the production of value-added biofuel, such as butanol and ethanol.

Pretreatment, or so called pre-hydrolysis, is required to alter the biomass macroscopic and microscopic size and structure as well as its submicroscopic chemical composition and structure. It can convert some carbohydrate polymers into fermentable sugars (Mosier *et al.*, 2005). Generally, either acid or alkaline can be used as catalyst for sugarcane bagasse pretreatment because acid can break down heterocyclic ether bonds between sugar monomers in the polymeric chains, which are formed by hemicellulose and cellulose, but the alkaline can remove lignin from the biomass, thus improving the reactivity of the remaining polysaccharides.

Microwave technique has been widely used in many applications of chemical research. Importantly, microwave irradiation is a new effective function for pretreatment of cellulosic materials because of its high heating efficiency, homogeneous temperature, increased reaction rate, reduced reaction time, and easy operation (Oshima *et al.*, 1984). Moreover, the microwave irradiation has been easily combined with chemical reaction to improve chemical reaction rate (Zhu *et al.*, 2005).

The objectives of this work were to evaluate practical benefits of microwave/chemical pretreatment, to investigate the optimal conditions of monomeric sugar production from sugarcane bagasse pretreated with dilute-alkaline and dilute-acid using microwave technique, and to compare the amount of monomeric sugar concentration obtained from each condition.