CHAPTER I
INTRODUCTION

Olefins have been used as raw materials in petrochemical industry to produce many kinds of polymers. Olefins can be produced from many commercial processes such as dehydrogenation, thermal cracking, catalytic cracking, methanol to olefins and etc. However the feedstocks to these processes are petroleum base which is non-renewable. Therefore, it is interesting to produce olefins from other resources such as biomass.

Biomass, such as wood, herbaceous materials and agricultural by-products are attractive as alternatives to fossil fuels because biomass is renewable and environmentally friendly. Furthermore, the use of biomass as energy or as a feedstock in petrochemical industry will not increase the amount of green house gases (i.e. carbon dioxide) to the earth atmosphere.

There are several methods to convert biomass into valuable products such as gasification, pyrolysis and digestion. Gasification process is the most suitable method for obtaining a high yield to valuable products. In general, gasification process utilizes oxidative gases such as CO_2, air and steam to make the partial oxidation reaction of biomass. CO_2 is not only a major component in natural gas but also generated by combustion. The emission of CO_2 to the atmosphere has been considered as a serious cause of the global warming or the green house effects. It is of great interest to use CO_2 as a gasifying agent for biomass gasification since we can simultaneously reduce the green-house gas in the atmosphere and also obtain the more valuable products from biomass.

The use of catalysts in the biomass gasification is very common in order to increase product yield and to allow low-temperature gasification of around 700-750 °C. The most catalysts are metals for examples nickel, iron, rhodium, platinum, dolomite, etc., because they give high activity at relatively low temperatures and can obtain valuable gases such as H_2, CO, CO_2, CH_4 and C_2H_4, C_2H_6, C_2H_2 and C_3H_6. In addition, catalyst can reduce tar formation which is a main problem of gasification processing.

Approximately 10% of petroleum is consumed in production of olefins and related chemical. To reduce our reliance on fossil fuels, it would be desirable to produce olefins from biomass. To produce olefins from biomass and reduce the CO_2 emissions, it would be desirable to use CO_2 gasification of biomass.

This work will study CO_2 gasification of biomass by using cellulose as a model biomass at 600-900 °C in a fixed-bed reactor and will evaluate the feasibility of using biomass as alternative chemical feedstock for olefin production.