CHAPTER I
INTRODUCTION

Global warming is caused by the emission of greenhouse gases. Carbon dioxide (CO_2) is the largest contributor responsible for 75% of the totally emitted greenhouse gases. Emission comes from various sources with the main contributors being combustion of fossil fuel used in power generation, transportation and industrial processes. According to the report of Intergovernmental Panel on Climate Change (IPCC), approximately three-fourths of the increase in atmospheric is CO_2 concentration, which is attributable from burning fossil fuel (Olajire, 2010).

CO_2 absorption has been receiving most significant attention in recent years and is being recognized as a promising option for CO_2 emission reduction. A widely developed technology to separate CO_2 from flue gas and natural gas streams is based on chemical absorption using liquid amines. Amines used include piperazine, a diamine which has been used effectively as absorption chemical due to its high absorption rate compared to other amines (e.g. monoethanolamine and methylethanolamine) (Cullinane and Rochelle, 2006). However, the amine system still suffers from various operation problems such as corrosion, oxidative degradation, high energy consumption and foaming of gas-liquid surface (Chang, 2009). In order to overcome these limitations, CO_2 adsorption is considered as an alternative technology in commercial and industrial applications due to its low energy requirement, ease of operation and low maintenance (Xu *et al.,* 2009). Various materials have been used as adsorbents including these functionalized adsorbents with amine groups to increase CO_2 capture capacity and selectivity.

Previous works studies the efficiency of CO_2 adsorption using modified biopolymer loaded with piperazine derivative. This work will continue on the novel modified biopolymers grafted with piperazine derivative for CO_2 adsorption and desorption.