# CHAPTER I
# INTRODUCTION

Global warming is of interest in the world society todays. Carbon dioxide is important contributor to global warming is due to a large increase of greenhouse gases, such as carbon dioxide, methane and nitrous oxide, especially the largest emission of carbon dioxide ($CO_2$) from industrial activities. In order to reduce $CO_2$ emissions into the atmosphere, a carbon capture and storage system is the most potentially effective technology. A well-known method to capture $CO_2$ from flue gas is amine-based absorption, which has been widely deployed on a large scale across several industries but there are some drawbacks: (i) corrosion of plant equipment, (ii) solvent regeneration requires high energy consumption, (iii) solvent lost by evaporation, and (iv) solvent degradation. An adsorption method is one of the alternative ways. However, there are some limitations, such as low $CO_2$ adsorption capacity and adsorption cycles used. In order to improve the $CO_2$ capturing capacity onto the adsorbent surface, adsorbents with high surface area with selective adsorption to $CO_2$ should be used. Many types of porous adsorbents, such as zeolites (Chatti et al., 2009,), mesoporous silica (Sharma et al., 2012), and fly ash (Maroto-Valer et al., 2008) were impregnated with amines, but these adsorbents show surface area reduction after amine loading due to pore plugging. The surface of adsorbents can be modified with an amine compound to increase adsorption selectivity to $CO_2$. This modification, amine functionalization, can be done during (pre-functionalization) or after (post-functionalization) adsorbent preparation. To avoid pore plugging, pre-functionalization is preferable. A promising high porous polymer called high internal phase emulsion polymers (PolyHIPE) can be prepared by water in oil or oil in water emulsion polymerization. It was possible that the amine compound could be part of the polymer structure by being introduced during emulsion polymerization. In this research, polyHIPE was prepared by oil in water emulsion polymerization using two types of surfactant (oil in water and water in oil) and amines (hexylamine and 1,3-diaminopropane) were added to the polyHIPE by pre-functionalization. Finally the polyHIPE-amine was tested for $CO_2$ adsorption.