CHAPTER V
CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

The impregnation of PEI can improve the CO_2 adsorption capacity due to the synergistic effects between the physical and chemical adsorption. The Low Mw PEI/AC shows the enhancement in the CO_2 adsorption capacity at 30 °C with a significant extent. The Med Mw PEI/AC and High Mw PEI/AC also show the increase in the capacity. Too high a loading leads to the decrease in the capacity due to the reduction in the surface area. At the higher temperature, the capacity is decreased because the adsorption is exothermic phenomenon. At 75 °C, the Low Mw PEI/AC shows lower adsorption due to the relaxation of PEI. On the contrary, the relaxation of PEI can increase the CO_2 adsorption capacity of the Med Mw PEI/AC and High Mw PEI/AC due to higher CO_2 accessibility. The Med Mw and High Mw PEI have larger molecular size than the Low Mw PEI leading to the entanglement between itself resulting in the relatively constant amine density per area. The adsorption capacity of PEI must be balanced with the CO_2 accessibility and amine density per area. Furthermore, an optimum amount of PEI loading and appropriate PEI molecular weight are needed to increase the CO_2 adsorption capacity.

5.2 Recommendations

Based on what has been discovered in this study, the following recommendation is suggested:

1) Use mesoporous activated carbon to get higher loading of PEI, and PEI can diffuse through the pore.
2) Treat the AC with a basic component to increase the basic groups in the AC structure.
3) Activate the AC with chemicals to get higher surface area.
4) Feed CO_2 with an appropriate amount of water for bicarbamate, which uses one amine group to catch one CO_2 molecule instead of formation of cabamate species.
5) Use other techniques to impregnate a PEI on the support such as surface polymerization of PEI or coating of PEI on surface of support.
6) Use piperizine as the promoter to increase the CO_2 adsorption capacity.