



CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

CO₂ adsorption on AC from coconut shell modified with PEI was studied. The addition of PEI does not enhance the adsorption capacity of the AC at 30 °C. At 30 °C, the physical adsorption is the main phenomena, and the adsorption depends on the surface area of the AC. On the contrary, the AC modified with PEI shows an improvement in the CO₂ adsorption at the elevated temperatures over the unmodified AC even though their surface area and pore volume are lower than the unmodified AC because chemisorption by PEI at 75 °C plays a more important role than at 30 °C. The CO₂ adsorption capacity depends on the amounts of PEI loading and the 0.28 wt% loading seems to be an optimum amount at 75 °C. A decrease in the adsorption capacity was found when the AC was loaded with 0.31 wt% PEI and higher because of the pore filling effect. CO₂ adsorption capacity of the regenerated modified AC can be recovered with minimal loss in the capacity. However, the capacity at 75 °C of the regenerated modified AC loses at a greater extent than that at 30 °C.

5.2 Recommendations

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

- 1) Add water with CO₂ to form a bicarbonate species. In this case, only one amino group is necessary for every CO₂ molecule instead of two in case of carbamate formation in the absence of water.
- 2) Use lower molecular weight PEI because it will be easier to diffuse into the pores of AC. So, the chemical adsorption by PEI molecules can occur in the pores instead of physical adsorption.
- 3) Use other types of adsorbents that have higher surface area such as nanofiber silica, and microporous silicate because a higher surface area will be able to adsorb more CO₂.
- 4) Regenerate the adsorbent in helium or argon atmosphere because helium and argon are an inert gas so it will help carry CO₂ out from the adsorbent.
- 5) Use some types of basic component such as ammonia, potassium hydroxide, sodium hydroxide, and nitrogen to treat carbon surface, which will increase the basic group of AC.