CHAPTER V

CONCLUSION AND RECOMMENDATIONS

CONCLUSION

Activated carbon beds adsorption capacity enhanced significantly after impregnation with piperazine. Although the excellence of piperazine did not reveal entirely due to the limitation of piperazine loading of 3.12 wt % as the physisorption still dominated the chemisorption. The capillary action allows piperazine to flow into the mesopore of the activated carbon, but blocks the micropore, which resulted in a loss of advantage gained by high surface area of activated carbon as evidenced by the dramatically decrease of the micropore surface area. Maximum 3.12 wt % of piperazine was loaded into the activated carbon which was likely due to the weak adhesive force between piperazine and the activated carbon. The highest CO_2 adsorption capacity improvement reaches as high as 40.09 % for Pz-Act.C in comparison with pure Act.C at room temperature. The moisturizing effect did not facilitate the adsorption but worsened the adsorption. Ultimately, the regeneration of the CO_2 loaded adsorbents to relieve CO_2 for reuse the adsorbents yielded the efficiency of 93.87 % for pure Act.C and 85.16 % for 3.12 wt % piperazine-activated carbon. The efficiency was not completely recovered due to the fact that some of the carbon dioxide molecules could still attach to the adsorbent surface or to the amine.

RECOMMENDATION

1. In order to utilize the full surface of the adsorbent with maximum loading for maximum adsorption capacity, it is suggested to choose a wider pore adsorbent to reduce the pore blockage. This is to suggest by using mesoporous silicas that have channel structure of nanopore opening with high surface area, such as SBA-15, MCM-41 and MCM-48. Besides silica gel, an inexpensive porous material can also be used.

2. To exhibit a strong covalent bonding interaction between the acidic CO_2 molecules and the modified basic active sites on the surface facilitates CO_2 adsorption, it is suggested to use amine-grafting method on treated activated carbon and mesoporous silicas to obtain a covalently tethered amine adsorbent (CTA), not only to gain benefits from high surface area adsorbent but the amine-grafting method also contribute to a comparatively higher adsorption rate and higher stability in cyclic runs than amine-impregnated ones.

3. The recommendation for the improvement of the adsorption capacity is to use higher pressure for the adsorption process instead of an atmospheric pressure via pressure swing adsorption (PSA) technique. The increase in the pressure will allow greater driving force of the gases molecules to repack and filled more in the pore space, therefore higher adsorption capacity.