CHAPTER V
CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

This study focuses on the comparison of the energy requirement and capital investment cost between conventional MEA and IL-based process using ionic liquid [emim][Ac] for post-combustion carbon dioxide capture process, based on the flue gas from coal burning power plant 180 MWe. In this study, Aspen Plus was used to do the simulation of both processes. The simulations show that in both processes greater than 90 % of CO_2 can be removed from the flue gas at high CO_2 purity (95 % for MEA and 98 % for IL-based process) and modelling results for the MEA process were in good agreement with a commercial process. The results show both lower energy requirement and lower capital investment cost of IL-based compared to MEA by 13.5 % and 3.75 %, respectively. Major type of energy consumption for MEA and IL-based process is steam and electricity respectively. The configuration of IL-based process is similar to the one used by Shiflett (Shiflett *et al.*, 2010). To conclude, the initial findings of IL-based process show its potential to replace conventional MEA-based process. However, further studies on this IL [emim][Ac] are recommended to ascertain this potential.

5.2 Recommendations

There have been many studies on improving MEA-based CO_2 capture process or finding new absorbent materials in order to increase the absorption capacity of the absorbent and decrease the regeneration energy of the capture process. One option is to use ionic liquid as absorption material in CO_2 capture process instead of using conventional aqueous amine, because of its benefit in lower energy consumption during solvent regeneration, low volatility and high thermal stability. However, the main drawbacks of using IL are much lower absorption capacity, much higher viscosity after reacted with CO_2 and higher cost of IL compared to MEA. Therefore, combining individual benefit of MEA with that of IL is an interesting issue. The extended work is recommended to use a mixed absorbent composed of MEA and [emim][Ac] to capture CO_2 and find the optimum mole ration of MEA to [emim][Ac] with the purpose of improving MEA-based CO_2 capture process in terms of energy and investment cost saving.