# CHAPTER V
# CONCLUSIONS AND RECOMMENDATIONS

## 5.1 Conclusions

In this work, the effects of various zeolites incorporated into CA polymer matrix on $CO_2/CH_4$ separation performance were investigated. All membranes were prepared by solution-casting method. The membrane separation performance was evaluated with based on the gas permeance and $CO_2/CH_4$ selectivity. The results clearly show that incorporating AgA zeolite into CA polymer matrix has effectively improved the $CO_2/CH_4$ separation performance as compared to the other zeolites investigated. This is because $Ag^+$ in AgA zeolite can reversibly and specifically form π-bonded complexes with $CO_2$ molecules and such complexes assist $CO_2$ molecules to pass through MMMs easier. However, further studies involving AgA-CA MMM stability and separation efficiency at different operating conditions should be investigated and compared with other types of MMMs.

## 5.2 Recommendations

From this work, it was found that the effect of the partial pore blockage of zeolites by the polymer chains and a decrease in polymer chain mobility play significant roles in the gas separation performance of MMMs. Moreover, physical properties of molecular sieve or adsorbent affects gas permeation and separation performance as shown in the results and discussion section, so, by considering the effects of both physical properties of adsorbent and interfacial properties between adsorbent and polymer chains, future work should focus on how to systematically design high separation performance MMMs, such as high selectivity and high permeability, to separate a specified gas pair, for example $O_2/N_2$ separation.