

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

In this study, the mixed matrix membranes were prepared using mesoporous MCM-48 as molecular sieve and polybenzoxazine as polymer matrix. The CH₄/CO₂ separation performance of the membrane increased when increasing MCM-48 loading, and was strongly affected by the gas diffusivity more than the gas solubility. The permeance of CH₄ was more than that of CO₂ governed by Knudsen diffusion mechanism, and CO₂ molecules have the ability to interact with the polar surface of the filler during the permeation. 10 wt% of MCM-48 loading showed the maximum CH₄/CO₂ selectivity and good interface between the polymer and MCM-48 particles when compared with higher content of MCM-48 loading. When comparing MCM-48/PBZ and MCM-41/PBZ membranes, the shape of gas molecules and the pore structure of molecular sieve seemed to affect the permeance of each gas.

The future work should be focused on the improvement of the separation performance of the MMMs using different filler loadings and study of interfacial adhesion between the filler and the polymer matrix.