CHAPTER V
CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

In this study, high internal phase emulsion polymer or polyHIPE was prepared from co-monomer of divinylbenzene (DVB) and vinyl benzyl chloride (VBC). Mixed surfactants of span80, CTAB and DDBSS equal to 20 wt% of monomer was used to form the emulsion. Toluene was used as a porogen, $K_2S_2O_8$ was an initiator and $CaCl_2.2H_2O$ was an electrolyte.

For the effects of monomer ratio, the external appearance of each ratio was the same which were white, brittle and chalky porous solid. The surface area of the polyHIPE increased when the amount of DVB increased. The monomer ratio provided highest surface area was 100% DVB, which was 303.0 m^2/g.

For the effects PEI loading, when 10 wt% PEI was loaded into the polyHIPE the colour of polyHIPE was pale yellow. With 100% DVB, PEI hardly remained in the polyHIPE because PEI was washed out by ethanol which resulted in the structure collapsed. However, for the monomer ratio containing VBC, PEI could form chemical bonds with VBC, so there was PEI remaining in the structure.

For the amount of PEI loading, with the different monomer ratio and 10 wt% PEI, at monomer ratio 100/0, there was only 0.11 wt% of PEI. When the ratios of VBC were increased from 10% to 50%, percentage of PEI loading in the polyHIPE was increased up to 1.7 wt%, but the percent of PEI in polyHIPE almost constant probably because 10 wt% PEI reacted completely with 7.5 %v/v of VBC. In addition, when percentage of PEI in the prepared solution was increased, percentage of PEI in polyHIPE was increased at monomer ratio 60/40, and the highest percent of PEI in polyHIPE was 2.57 wt%.

5.2 Recommendations

Although the polyethyleneimine (PEI) can be loaded into the polyHIPE with monomer ratio DVB/VBC of 60/40, but several recommendations could be offered as follows:

5.2.1 Suggestions for CO_2 Adsorption

The polyHIPE with PEI loading was synthesized but it was not tested for CO_2 adsorption. For the further study, it may be good to study the adsorption to confirm that this material can be used for capturing CO_2.

5.2.2 Suggestions for the PolyHIPE Preparation

One of the most important steps for the polyHIPE preparation is the emulsion step. This material was prepared in a form of emulsion, if the emulsion does not homogeneous or the mixing does not good enough (may be from an improper magnetic bar or stirrer), the polyHIPE will shrink and collapse.