CHAPTER V

CONCLUSION AND SUGGESTION

5.1 Conclusion

Polyelectrolyte complex (PEC) hydrogel beads based on chitosan and carrrageenan were developed for drug controlled release in a simulated gastrointestinal condition. The dissolution profiles of all formulations were strongly dissolution medium dependent. The release of drug was controlled by the solubility of DFNa and the ionic interaction between the $-NH_3^+$ groups of chitosan and the $-SO_4^{2-}$ of carrageenan. None of the swelling and erosion of the beads were observed in the dissolution medium (pH 1.2, and 7.4), therefore, the mechanism of the drug release was attributed to the dissolution of DFNa in the dissolution medium and the diffusion of DFNa through the hydrogel beads.

The controlled release of the drug was greatly influenced by the bead composition due to the differences of the ionic interaction and concentration of the drug within the beads. The most suitable formulation consisted of chitosan and carrageenan with 2/1 ratio and 5% (w/v) DFNa. The release of drug from this formulation was minimal in the dissolution medium pH 1.2 and increased in higher pH, associated to each part of the GI tract. The formulation was able to maintain the release for approximately 8 hours.

The beads that were crosslinked with glutaric acid showed better results than the non-crosslinked ones, and the glutaraldehyde-crosslinked beads were the best with regard to the effectiveness of the prolonged release of the drug over 24 hours.

Finally, the drug release of all formulations fell into both the first-order and Higuchi model during the third - fourth hour, and were likely to follow Higuchi model for the release of drug afterwards.

5.2 Suggestion for Future Work

In this work, the release of sodium diclofenac is not completely dissolved out from the hydrogel beads. In order to overcome these disadvantages, we suggest that the bead size should be reduced or prepared in a microsphere form. The small size and high surface area to volume ratios of the microsphere made it easier for drug to diffuse through the polymer matrix.