CHAPTER V

CONCLUSION AND SUGGESTION

5.1 Conclusion

Polyelectrolyte complex (PEC) hydrogel beads based on chitosan and polyethylene glycol were developed for drug controlled release in simulated gastrointestinal condition. The release of drug was controlled by the solubility of DFNa, the ionic interaction between the $-NH_3^+$ group chitosan and the group of $P_3O_{10}^{5-}$. In addition, swelling and erosion of the bead at various dissolution conditions (pH 1.2, and 7.4) were studied.

The controlled release of sodium diclofenac (DS) from chitosan (CS)/polyethylene glycol (PEG) polyelectrolyte complex hydrogel beads were investigated in simulated gastrointestinal fluid. Following the optimization of the polymer to drug ratio, the chitosan beads were modified by the ionic cross-linking method with varying concentrations and pH of tripolyphosphate (TPP) coagulant solution as well as cross-linking time. The CS/PEG/DS bead obtained with the weight proportion of 1/0.5/0.5 and 10% TPP at pH 6.0 and 30 minutes of cross-linking time was found optimal, yielding an excellent encapsulation of over 90% drug entrapment efficiency. The dissolution profile of DS from CS/PEG beads exhibited that a good slow release profile was achieved from the 5^{th} hour to 24^{th} hour. The drug prolonged release was far more superior upon further cross-linking the hydrogel with glutaraldehyde (GD).

The CS/PEG/DS beads cross-linked with both TPP and GD were able to provide the best delayed release in the gastric simulated fluid (pH 1.2). The remaining drug content was gradually released within 24 hours in the intestinal simulated fluid (pH 7.4). In all, the CS/PEG beads, cross-linked with TPP and GD, have been proven very useful as a novel alternative for gastrointestinal drug release system.

5.2 Suggestion for Future Work

In this work, the release pattern of sodium diclofenac from chitosan-polyethylene glycol, crosslinked with sodium tripolyphosphate and glutaraldehyde beads was close to those of the commercial sustained tablet. In order to overcome these disadvantages, we suggest that the combinations of sodium diclofenac and other drugs e.g. the anti-biotic drugs will be improved for the optimum sustained release.