CHAPTER V

CONCLUSIONS

In this study, acyclovir tablets formulated using hydrophilic matrix system was successfully prepared by wet granulation method. Hydroxypropyl methylcellulose, xanthan gum, sodium alginate and carbopol 934P were used as retarding polymer. The influences of important factors including polymer loading, type of diluent, pH and ionic strength of dissolution medium on drug release characteristics were investigated. The mechanism of drug release was also examined. In addition, swelling and erosion of the matrices were evaluated in order to understand the role of swelling and erosion characteristics in controlling drug release. Moreover, the surface morphology of hydrated matrices was observed by scanning electron microscope in order to clarify the main mechanism of drug release. The following conclusions could be drawn:

1. Sustained release of acyclovir was achieved from hydrophilic matrices containing hydroxypropyl methylcellulose, xanthan gum and sodium alginate, while carbopol 934P did not produce sustained release property.

2. The influence of polymer concentration on drug release rate was observed. An increase in polymer concentration caused a decrease in drug release rate. However, other factors such as swelling behavior of the matrices, strength of the swollen gel layer around the matrices and solubilities of drug and diluent in dissolution medium might play a more important role and thus obscured the role of polymer loading on drug release rate.

3. The effect of type of diluent on drug release rate depended on amount and solubility of the diluent in the dissolution medium.

4. The differences in the strength of the gel barrier and solubility of the drug in dissolution media with different pH values resulted in the difference in drug release

rate in these dissolution media. The stronger gel layer around the matrices and the lower solubility of the drug in the dissolution medium resulted in the slower drug release rate. Moreover, for sodium alginate matrices, the dependence of drug release pattern and also mechanism of drug release with respect to the pH of the dissolution medium could be explained in terms of the differences in solubility of sodium alginate in these dissolution media.

5. The influence of ionic strength of dissolution medium on drug release rate was observed. The drug release rate trended to decrease with increases in ionic strength of the dissolution medium. The stronger gel barrier of the matrices hydrated in higher ionic strength of the dissolution medium could explain this finding.

6. For various matrix formulations and dissolution media, the factors controlled drug release rate of the matrices were the physical and mechanical properties of the swollen gel layer around the matrices and the drug solubility.

7. The swelling and erosion profiles gave the important information to explain the differences in drug release rates in dissolution medium with different pH values and ionic strengths.

8. The drug release was controlled by diffusion and polymer relaxation. The drug release mechanism of the matrices depended on drug solubility and also physical and mechanical properties of the hydrated gel layer around the matrices.

9. The surface morphology was a useful clue to verify the main drug release mechanism.

This study could be employed as a useful basic knowledge for further development of acyclovir sustained release tablet. The further investigation should be *in vivo* study and then clinical trial and large scale production might performed.