CHAPTER VI

CONCLUSIONS

The dissolution of nifedipine, a very slightly water-soluble, can be enhanced by incorporation of highly water soluble carriers via solid dispersion. The carriers in the scope of this study were polyethylene glycol 4000 and 6000, poloxamer 188, 288, 407, β-cyclodextrin and 2-hydroxypropyl-β-cyclodextrin.

1. Dissolution rate enhancement: All carriers was found to enhance the dissolution rate of nifedipine from solid dispersions. The group of poloxamers showed the highest level of dissolution improvement followed by PEGs and cyclodextrins respectively.

Among poloxamer group, poloxamer188 exhibited highest dissolution rate followed by poloxamer288 and poloxamer407 respectively. PEG4000 and PEG6000 showed very close dissolution rate improvement. β-cyclodextrin and 2-hydroxypropyl-β-cyclodextrin also fell into the same manner with PEGs as β-cyclodextrin profile, in many cases, showed superimpose with 2-hydroxypropyl -β-cyclodextrin.

2. $T_{80\%}$: The shortest $T_{80\%}$ was found in the system of poloxamers at 15 minutes whereas the pure drug showed $T_{80\%}$ of 225 minutes. Nifedipine-poloxamer188 prepared by melting method at all ratios gave the $T_{80\%}$ of 15 minutes except the ratio of 1:1.

3. Suitability of methods used, it was found that all carriers could be prepared by kneading method. Melting method was not applicable to

cyclodextrin group whereas solvent method was suitable to prepare all carriers except β-cyclodextrin.

In terms of enhancement of dissolution rate, melting method seemed to be the most attractive technique followed by solvent method and kneading method respectively.

4. Mechanism: The main mechanisms in each groups were investigated by SEM, X-ray diffraction, DSC thermogram, IR spectra, solubility and wettability.

4.1 For the poloxamer systems, the main mechanisms were amorphous transformation and solubilizing effect.

4.2 For PEGs, amorphous transition was the main mechanism.

4.3 For cyclodextrins, amorphous transition and particle size reduction were the main mechanisms. In this case, amorphous transition was attained only some extent which was relatively less than that of the poloxamer and PEG systems. It was revealed that in this experiment nifedipine did not form inclusion complex with β-cyclodextrin and 2-hydroxypropyl-β-cyclodextrin.