CHAPTER V

CONCLUSIONS

Biopolymeric particles were prepared by ionotropic gelation technique. The anionic alginate polymer was partially cross-linked with calcium ion to entrap a drug. Next, cationic chitosan polymer was added to attract with charged interaction that stabilizing a particle. The obtained particles were used as a carrier of water-soluble drug, glucosamine hydrochloride. The hydrophobic chitosan, *N*-butylchitosan with degree of substitution not over 50% was used to sustain a glucosamine release. Glucosamine-loaded particles with the size of 300-400 nm and zeta potentials of -26 to -29 mV were obtained. The effect of % butylation of chitosan on loading efficiency that using N-butyl chitosan with high degree of butylation led to an increase in GH loading efficiency of up to 67%.

GH release profiles shown GH rapid release in first 3 hours. Then the release rate decreased slowly and constant after 6 h of incubation in phosphate buffer pH 7.4 at 37 ^{o}C. Simulated skin permeation profiles of GH were carried out by using drug gel formulation that containing GH loaded particles through 0.2 μm cellulose acetate membrane. GH was continuously released up to 8 h. After 12 h, GH was slowly released until constant. Carbopol gel helped slow down the release of GH. Since GH is highly water-soluble and quickly released in buffer solution, the LE values in this study could not be determined correctly. Physical stability of particle in the suspension and gel containing GH-loaded particle was evaluated at room temperature. The particle size was found to be significantly larger after stored in the gel for more than 7 days, suggesting particle aggregation.

The key advantage of this study, it can be seen that a less hydrophilic chitosan in formulation of particles intended to more entrap and sustain release a water-soluble drug e.g. glucosamine hydrochloride. Detailed release profile of the GH-loaded particles prepared from low (about 10%substitution) butylation can be further investigated, since it was shown from this study that with high degree of butylation (46%substitution), only 30% of GH was released from the particles. The particle storage should be kept in dried form, adding cryoprotectant to prevent a particle collapse after separation and lose of GH during storage.