CHAPTER 5

CONCLUSIONS

From the study on encapsulation of *Lactobacillus fermentum* 2311M, all results can be concluded as followed;

1. The optimum conditions were 50-60 minutes of agitation. The optimum agitation, 50 minutes was able to produce microbeads sizes 5-10 μm in diameter for alginate and κ-carrageenan microbeads. The optimum agitation time for immobilized bacterial cells in alginate and κ-carrageenan microbeads can be produce microbeads sizes 20-80 μm and 120-160 μm, respectively.

2. The effect of pH 6.5 on viable count of free and encapsulated cells in alginate and κ-carrageenan beads. We can determine that at pH 6.5 (distilled water) had no effect on survival of free and encapsulated cells.

3. The survival of encapsulated and free cells at pH 1.5. We can determine that encapsulated cells (alginate and κ-carrageenan beads) can survive at low pH condition better than free cells.

4. The survival of encapsulated and free cells at 0%, 0.15% and 0.3% of bile salt solution. We can determine that at 0% of bile salt solution had no effect on survival of free and encapsulated cells. Alginate and κ-carrageenan beads can survive at 0.15% and 0.3% of bile salt solution better than free cells.

5. The viable cell numbers during storage of alginate bead were found to be better than free cells at 4 ^{o}C, 8 ^{o}C and 20 ^{o}C. Storage at 20°C was found to be the best condition during the storage for 3 months. While, viable cell numbers of κ-carrageenan beads was less than free cells at 4 ^{o}C, 8 ^{o}C and 20 ^{o}C.

From this study, it was found that the survival of encapsulated cells was strongly dependent on various parameters, such as alginate and κ-carrageenan concentration, bead size, initial cell numbers and bacteria species. Moreover, microencapsulation technique for encapsulated probiotic bacteria will be further study such as release of encapsulated cell when the microbead are incorporated into products, such as dairy products or drug.