CHAPTER V

CONCLUSION

Green tea drink is a popular beverage because of its antioxidant activity and health benefit. Catechins, the polyphenolic compounds, are the main compounds of green tea that can be classified into 4 types: (-)-epicatechin (EC), (-)-epicatechin gallate (ECG), (-)-epigalocatechin (EGC) and (-)-epigalocatechin gallate (EGCG). Although, green tea has high benefit but catechins degraded easily which give the serious problem to the quality of green tea.

In this study, green tea extract was obtained by the organic solvent extraction. This method gave the brownish powder with high antioxidant activity. However, the yield of this method was lower than that of hot water extraction [3]. Analytical method using high performance liquid chromatography with reverse phase C18 column equipped with ultra-violet detector was applied to determine the amount of catechins. The mobile phase consisted of acetonitrile and water (17:87 v/v) that contained 0.05% of trifluoroacetic acid. The UV-VIS detector was set at 210 nm. Analysis results indicated that the amount of ECG (13.69 ± 3.51 mg of green tea extract 100 mg) and EGCG (13.10 ± 1.55 mg of green tea extract 100 mg) were higher than others catechins.

Chitosan was frequently used for microencapsulation. Some reports indicated their success in the entrapment of polyphenolic into chitosan microparticle [39, 43]. Chitosan microparticles in this study were prepared by solvent evaporation technique. This method was often used for hydrophilic compound encapsulation. However, the novice of the current study is that the solvent and continuous phase were acetone and cyclomethicone (DC 345) respectively. The advantage of the use of these chemicals is the ease of particle harvesting. Small microparticles (1.66 ± 0.55 μm) and higher encapsulation efficiency were obtained in our study. Chitosan microparticle properties depended on several influence parameters such as chitosan concentration, TPP concentration and homogenizer speed. Entrapment efficiency of catechins in

microparticles depended on the concetration of emulsifier and amount of green tea loaded. The optimum concentration was 5% green tea extract and 2.5 % DC5225C®. Furthermore, the different of entrapped amount of each catechins in chitosan microparticles was also a result from the different degradation kinetic of catechins. EGC had the highest entrapment because it is the most stable compound among tea catechins. Catechins entrapped in chitosan particles had different release profile under various pH conditions. All catechins were released from chitosan particle rapidly in pH 2 because the particles were eroded in acidic condition. The release of each catechins began different in pH5.5. EGCG and ECG were released slowly but EC and EGC were released rapidly. In the neutral condition, the releasing of EC and ECG were more than that of EGCG and EGC because EC and ECG were more stable in neutral solution than other catechins.

The release profiles indicated that the released of catechins from chitosan microparticle could be separated into 2 groups. First group was EGC and EC which were released from chitosan particle rapidly. The second was EGCG and ECG which were released from chiosan particle slowly. However, their mechanism was not resolved clearly because the interaction between chitosan and polyphenolic was unclear [39].

The stability of catechins was concerned seriously. Recent reports attempted to solve this problem with several methods but these results were not satisfied. The stability of catechins in chitosan microparticle was also observed in this study. Catechins encapsulated in chitosan microparticle showed more stability than free catechins under every test conditions, especially in 45 ^{0}C at pH 5. However, the degradation of catechins in chitosan particle trended to be more rapidly in high temperature and high pH but their degradation was still less than that of free catechins. The photo-stability testing showed the satisfied results as well. Catechins could be protected from light degradation effectively by entrapped in chitosan microparticle. However, the photo-stability testing indicated that catechins degradation in chitosan particles was still occurring with minor extent when compare to that of unentrapped catechins when exposed to aqueous

medium. The degradation of entrapped catechins was induced from the penetration of water into chitosan microparticle [36].

In conclusion, the technique for preparing chitosan microparticles containing Assum tea extract was successfully developed. The technique is suitable for micro-encapsulation of heat sensitive hydrophilic compound into chitosan microparticles with the ease of particle harvesting. The stability of tea extract in chitosan microparticles is far better than that of unentrapped one.