CHAPTER V

CONCLUSION

Curcuminoid microcapsules could be prepared by Spray-drying techniques employing different polymers, including polymethacrylate (PM), and ethylcellulose (EC), and different plasticizers, including propylene glycol (PG), grycerol triacetate (GTA), and polyethylene glycol (PEG400) with the operating conditions, i.e. inlet air temperature of 120°C, aspirator rate of 28 m^3/hr, pump rate of 5 mL/min, and rotameter of 30 mm. The preparation of PM-coated microcapsules plasticized with PG by spray-drying process gave the greatest yield of 59.6%, whereas PVA-coated microcapsules could not be prepared under the spray-drying conditions set in this study due to its low minimum film formation temperature (MFT).

The percent content and percent entrapment of curcuminoids were markedly affected by the ratio of curcuminoids: polymer, percent solid content in feed formulation, and types of plasticizer. EC-coated microcapsules plasticized with PG, using curcuminoids: polymer ratio of 1:1 and 1%solid content of feed formulation, was found to have highest percent content (53.60%) and percent entrapment of curcuminoids (107.20%) whereas EC-coated microcapsules plasticized with the combination of PG/GTA, using curcuminoids: polymer ratio of 1:3 and 2% solid content of feed formulation was found to have lowest percent content (9.14%) and percent entrapment of curcuminoids (36.57%). Five types of microcapsules selected for further study were PM-coated microcapsules plasticized with PG using 1:1 curcuminoids : polymer ratio (no.7), PM-coated microcapsules plasticized with PG/PEG400 using 1:1 curcuminoids: polymer ratio (no.13), EC-coated microcapsules plasticized with PG/GTA using 1:1 curcuminoids: polymer ratio (no.37), EC-coated microcapsules plasticized with PG using 1:1 curcuminoids: polymer ratio (no.43), and EC-coated microcapsules plasticized with PG/PEG400 using 1:1 curcuminoids: polymer ratio (no.49).

SEM images and particle size distribution graphs showed that spray-dried microcapsules were spherical shape but some of them were dent and agglomerated. PM-coated microcapsules appeared to have smoother and more continuous surface whereas the EC-coated microcapsules appeared to have rugged and uneven surface. Polymeric film plasticized with additional PEG400 was observed to promote the homogeneous of the film surface. However, all types of spray-dried microcapsules contained some un-encapsulated parts of curcuminoid extract.

The bulk and tapped densities of all the selected microcapsules were similar, with the exception of PM-coated microcapsules plasticized with the combination of PG/PEG400 (no.13) which were lowest according to the higher level of particular agglomeration. The interparticular interactions represented by Hausner ratio of all selected microcapsules were similar. There was remarked difference between moisture contents of PM-coated microcapsules and EC-coated microcapsules. PM-coated microcapsules had significantly higher moisture content than EC-coated microcapsules.

In the chemical stability study, PM-coated microcapsules plasticized with the combination of PG/PEG400 (no.13) was most stable as it showed the highest retention percentage at all testing temperatures after storing for three months.
PM-coated microcapsules plasticized with the combination of PG/PEG400 had markedly higher percent retention of curcuminoids than other formulations. Due to its dense structure, PM coating is less permeable than EC. However, there was no remarkably difference between percent retention of curcuminoids from microcapsules stored at 4°and 50°C.

For cleansing gel pH5, PM-coated microcapsules plasticized with PG (no.7) and EC-coated microcapsules plasticized with PG (no.43) were found to had markedly higher percent retention of curcuminoids and be most suitable formulations. The wall system of these two microcapsules formulations was found to increase the stability of curcuminoids in cleansing gel pH5. However, for moisturizing cream,

there was no remarkably difference between percent retention of curcuminoids from differently-coated microcapsules.

The structures and chemistry of coating materials were found to affect the physicochemical properties of spray-dried curcuminoid microcapsules. Hence it is important to select carefully the type of coating materials, including polymers and plasticizers, as it may influence the stability of the final curcuminoid microcapsules. This study would be helpful to promote the application of curcuminoids.