

Sarayuth Duangkaew 2011: Production of Ethanol-in-Oil-in-Water Emulsion (E/O/W) for Encapsulation of *Centella asiatica* Extracts. Master of Science (Food Science), Major Field: Food Science, Department of Food Science and Technology.  
Thesis Advisor: Ms. Utai Klinkesorn, Ph.D. 98 pages.

The objective of this research was to create the stable ethanol-in-oil-in-water (E/O/W) multiple emulsions used as a encapsulation system for ethanol soluble bioactive compounds from *Centella asiatica*. The effect of emulsifier type and concentration on stability of single emulsions (E/O emulsions) and multiple emulsions (E/O/W emulsions) was studied by evaluation of creaming stability, turbidity, droplets size and microstructure of the emulsions. The results found that type and concentration of emulsifier affected the stability of the emulsions. The single emulsions stabilized by polyglycerol polyricinoleate (PGPR) were more stable to creaming than decaglycerol mono-oleate (DGMO) and lecithin, respectively. A stable single emulsion could be prepared by using 2 wt% PGPR as an emulsifier and 10 wt% ethanol as dispersed phase. The droplet size distribution of this single emulsion was monomodal with Z-average of  $0.60 \pm 0.09 \mu\text{m}$ . The emulsion was stable to phase separation after storage at  $25^\circ\text{C}$  for 7 days. A stable E/O/W multiple emulsion could be prepared by using 2 wt% sodium caseinate as an emulsifier and 5 wt% single emulsion with Z-average of  $0.30 \pm 0.03 \mu\text{m}$ . The multiple emulsions having high encapsulation efficiency ( $\sim 97\%$ ) were stable to thermal treatments ( $30\text{-}90^\circ\text{C}$  for 30 min), freeze-thawing ( $-18^\circ\text{C}$  for 22 h/ $25^\circ\text{C}$  for 2 h), pH (6-8) and addition of sodium chloride (0-200 mM). The multiple emulsion produced in this study could be an excellent system for encapsulation of water insoluble bioactive compounds for use in a variety of food products.

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