

Thanitchai Pruchyathawornkul 2009: Encapsulation of *Spirulina* Extract by Spray-Dried and Multiple Emulsion Techniques. Master of Science (Food Science), Major Field: Food Science, Department of Food Science and Technology. Thesis Advisor: Mrs. Sasitorn Tongchitpakdee, Ph.D. 125 pages.

The objectives of this research were to study the effect of inlet temperatures on C-phycoerythrin content and antioxidant capacity of spray-dried *Spirulina* (*Spirulina platensis*) as well as to study the effect of encapsulation using maltodextrin on stability of C-phycoerythrin content and antioxidant capacity. Encapsulation of C-phycoerythrin using multiple emulsion technique (water-in-oil-in-water emulsion, W/O/W) was investigated. The results showed that there were no significant differences in C-phycoerythrin content and antioxidant capacity of spray-dried *Spirulina* ($p>0.05$). However, the crude protein content of *Spirulina* sample spray-dried at 200 °C was decreased ($p\leq 0.05$). The results also revealed that the degradation of C-phycoerythrin followed first order kinetic and its degradation rate increased with storage temperature. To study the effect of encapsulation using maltodextrin on stability of C-phycoerythrin content and antioxidant capacity, *Spirulina* was encapsulated using maltodextrin (Dextrose Equivalents (DE) 10 and 20) as a wall material with ratios of core to wall material (c/w) at 1:1, 1:2 and 1:3 and stored at 30, 50 and 70 °C (11% relative humidity) for 4 weeks. The results showed that encapsulation using maltodextrin increased C-phycoerythrin stability by decreased rate constant (k) of degradation and increased activation energy (E_a). Maltodextrin DE 20 offered greater protection of C-phycoerythrin and antioxidant capacity than maltodextrin DE 10. In addition, increasing proportion of wall material would increase more protection of C-phycoerythrin and antioxidant capacity. To investigate the encapsulation of C-phycoerythrin using multiple emulsion technique (water-in-oil-in-water emulsion, W/O/W), 2% polyglycerol ester of polyricinoleic acid (PGPR) and 10% gum arabic were used as lipophilic and hydrophilic emulsifier, respectively. The results showed that the multiple emulsion could encapsulate C-phycoerythrin. Moreover, the multiple emulsion was stable to high temperature (30-90 °C), freeze-thaw (3 cycles) and pH (pH 4-8).

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