

<b>Thesis Title</b>	Characterization and Formulation of Natural Face Powder
<b>Author</b>	Nway Yu Hnin
<b>Degree</b>	Master of Science (Cosmetic Science)
<b>Advisor</b>	Assoc. Prof. Mayuree Kalayavattanakul, Ph. D.

## ABSTRACT

This study was aimed to study the physicochemical properties of natural powders which were used to develop natural face powder formulations. Thanaka powder, corn flour, mung bean starch and rice bran flour were reduced sizes to less than 45  $\mu\text{m}$ . These powders were fine with yellowish light brown to white. Corn flour was agglutinate, mung bean starch and rice bran flour slightly agglutinate. Those of prohibited metals, e.g. Hg, Pb, As and Cd which were crucial for cosmetic products, were detected below the limitations as regulated by ASEAN guidelines in these natural materials. They showed melting temperature at 70.25-74.92  $^{\circ}\text{C}$  by DSC, which made them applicable for solid dosage form. The percentage of crystallinity were 22.52-38.55% by XRD, which Thanaka powder had the highest value so it would be more resistant to high temperature. The flowability of Thanaka powder and mung bean starch were good, whereas corn flour and rice bran flour were good cohesiveness. They were able to absorb water (7.84-17.31%) and oil (soybean oil; 5.47-13.39%, olive oil; 5.06-12.65% and mineral oil 5.58-11.98). Under long term stability test at ambient temperature and 45  $^{\circ}\text{C}$  for 3 months without exposing to light, the color difference ( $\Delta E$ ), of Thanaka powder, corn flour, mung bean starch and rice bran flour were less than 1.5 ( $\Delta E \leq 1.43, 0.87, 1.45$  and  $1.40$ , respectively for each natural material), thus the color changes of them could not be detected by human eyes. Thermal properties of corn flour, mung bean starch and rice bran flour had minor shifts, while Thanaka powder was more resistant for higher temperature. Water absorption, oil absorption capacities and % crystallinity of Thanaka powder, corn

flour, mung bean starch and rice bran flour were insignificantly ( $p \geq 0.061$ ) changed. Hence, certain natural raw materials were considered to be safe (in terms of total elemental analysis) and stable, and would be suitable for cosmetic solid dosage form development.

Natural loose powder and natural compact powder formulations were prepared by using Thanaka powder as pigment and absorbent, corn flour as adhesive, mung bean starch and rice bran flour as fillers and *Helianthus annuus* seed oil, *Rosmarinus officinalis* leaf oil and *Foeniculum vulgare* oil as preservative, except olive oil as liquid binder was added into the later one. Natural loose powder was yellowish white powder but natural compact powder was slightly darker than the other one. The developed products were good slip, absorbency, adhesiveness and bloom but poor coverage. Both developed natural face powders showed SPF values as 1.41-1.55. Under 6 heating-cooling cycles, the color changes could not be detected by naked eyes because the color difference was  $\leq 1.05$ . In terms of UVA and UVB protection, the values of both developed natural face powders changed less than  $4.02 \pm 0.82\%$  after 6 heating-cooling cycles.

**Keywords:** Natural Face Powder, Thanaka Powder, Corn Flour, Mung Bean Starch, Rice Bran Flour