

Thesis Title Effects of Antioxidants on Shelf-life and Stability of Food Colorant from Carotenoids Extracted from Crude Palm Oil

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ABSTRACT

The effects of antioxidant agents on shelf-life and stability of food colorant from carotenoids extracted from crude palm oil have been studied in oil dispersion and emulsion forms. Effects of synthetic antioxidants, BHA, BHT and TBHQ were compared with control (no antioxidant). Change of β -carotene concentration in food colorant was evaluated by UV/vis spectroscopy.

Food colorant from carotenoids in oil dispersion and emulsion form, packed in dark vial, flushing with N_2 and stored at 30 ± 5 and $5 \pm 2^\circ C$, respectively was stable during storage. β -carotene concentrations was decreased less than 10% ($p > 0.05$) during 180 days storage in every treatment. Acid value and peroxide value changes was not significant ($p > 0.05$). The amount of total plate count and yeast-mold in emulsion decreased from the initial amount.

The degradation of β -carotene at 140.0 - $160.0^\circ C$ in oil dispersion followed the first-order reaction kinetics. The activation energy (E_a) and z value was found to be 67.40 - 105.94 kJ/mol and 32 - $52^\circ C$, respectively. The order of food colorant stability was $BHT > TBHQ > BHA > \text{control}$. The z values were found to be 32.36 , 36.63 , 39.22 , and $51.02^\circ C$, respectively.

The degradation of β -carotene at 90.0-100.0°C in emulsion followed the first-order reaction kinetics. The E_a and z value was found to be 101.07-125.48 kJ/mol and 21-26°C, respectively. The order of food colorant stability was BHT > TBHQ > BHA > control. The z values were found to be 20.66, 22.27, 22.32, and 25.64°C, respectively. Therefore, addition of BHT will improve the stability of β -carotene in 2 forms of food colorant and N_2 flushing will improve thermal stability of food colorant.

The seal of Chiang Mai University is a circular emblem. In the center is a detailed illustration of an elephant standing and facing left. Above the elephant's head is a traditional Thai oil lamp (diya) with a flame. The entire central image is enclosed within a circular border. The border contains the university's name in Thai script at the top and 'CHIANG MAI UNIVERSITY 1964' in English at the bottom. There are also decorative floral motifs on the left and right sides of the border.

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