EFFECT OF CURCUMIN NANOPARTICLES ON OXIDATIVE STABILITY OF SUNFLOWER OIL-IN-WATER EMULSIONS

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ABSTRACT

Curcumin is a natural polyphenolic compound that is obtained from the root of *Curcuma longa* Linn (turmeric). Oil oxidation is an undesirable series of chemical reactions involving oxygen that degrades the quality of oil. The aim of the present study was to develop a method to nano-particularize curcumin in order to increase its antioxidant efficiency against oxidation of sunflower oil. For this purpose, curcumin was dissolved in dichloromethane, injected in heating water (60 ºC) including tween 80 and then stirred. After characterization of the particle size and distribution of the fabricated curcumin nanoparticles, they were lyophilized. In formation of the oil phase of emulsion with nanocurcumin (ENC), nanocurcumin was added into oil-in-water system in which sunflower oil was used as the oil phase. Oxidation stability of oil-in-water emulsions including curcumin nanoparticles was measured by oxidation test reactor. As a result, 98 % of the particles were in mean diameter of 9-10 nm. The formed nanoparticles were characterized by scanning electron microscope, Fourier Transform Infrared Spectroscopy and thermogravimetric analysis. Unlike curcumin, nanocurcumin was found to be freely dispersible in the presence of the surfactant. The chemical structure of nanocurcumin was the same as that of curcumin, and no remarkable change was observed during nanoparticle preparation. Thermal degradation of the nanocurcumin was similar to that of curcumin. It was found that emulsion with nanocurcumin (ENC) was more effective than those with and without curcumin against oxidation of the sunflower oil, as revealed by the longer induction periods (IP) for ENC (1 hr 20 min) than those for emulsions with and without curcumin (60 min. and 53 min.) The results demonstrated that the water solubility and antioxidant activity of curcumin was markedly improved by particle size within the nano-range.

Key Words : Sunflower oil, nanocurcumin, nanotechnology, oxidative stability, molecular and thermal characterization.