

Extraction and Encapsulation of Carotenoids from Carrot

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Abstract : The color of food is one of the decisive factors for consumers. Potential toxicity of artificial food colorants has led to the consumers' preference for natural products over products with artificial colors. Natural pigments have many bioactive functions, such as antioxidant, provitamin and many other. Having this in mind, the acceptability of natural colorants by the consumers is much higher. Being present in all photosynthetic plant tissues carotenoids are probably most widespread pigments in nature. Carrot (*Daucus carota*) is a good source of functional food components. Carrot is especially rich in carotenoids, mainly α - and β -carotene and lutein. For this study, carrot was extracted using classical extraction with hexane and ethyl acetate, as well as supercritical CO₂ extraction. The extraction efficiency was evaluated by estimation of carotenoid yield determined spectrophotometrically. Classical extraction using hexane (18.27 mg β -carotene/100 g DM) was the most efficient method for isolation of carotenoids, compared to ethyl acetate classical extraction (15.73 mg β -carotene/100 g DM) and supercritical CO₂ extraction (0.19 mg β -carotene/100 g DM). Three carrot extracts were tested in terms of antioxidant activity using DPPH and reducing power assay as well. Surprisingly, ethyl acetate extract had the best antioxidant activity on DPPH radicals (AADPPH=120.07 μ mol TE/100 g) while hexane extract showed the best reducing power (RP=1494.97 μ mol TE/100 g). Hexane extract was chosen as the most potent source of carotenoids and was encapsulated in whey protein by freeze-drying. Carotenoid encapsulation efficiency was found to be high (89.33%). Based on our results it can be concluded that carotenoids from carrot can be efficiently extracted using hexane and classical extraction method. This extract has the potential to be applied in encapsulated form due to high encapsulation efficiency and coloring capacity. Therefore it can be used for dietary supplements development and food fortification.

Keywords : carotenoids, carrot, extraction, encapsulation

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