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Ultrasound-Assisted Extraction of Carotenoids from Tangerine Peel Using Ostrich Oil as a Green Solvent and Optimization of the Process by Response Surface Methodology

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Abstract : Carotenoid pigments are a various group of lipophilic compounds that generate the yellow to red colors of many plants, foods and flowers. A well-known type of carotenoids which is pro-vitamin A is β-carotene. Due to the color of citrus fruit's peel, the peel can be a good source of different carotenoids. Ostrich oil is one of the most valuable foundations in many branches of industry, medicine, cosmetics and nutrition. The animal-based ostrich oil could be considered as an alternative and green solvent. Following this study, wastes of citrus peel will recycle by a simple method and extracted carotenoids can increase properties of ostrich oil. In this work, a simple and efficient method for extraction of carotenoids from tangerine peel was designed. Ultrasound-assisted extraction (UAE) showed significant effect on the extraction rate by increasing the mass transfer rate. Ostrich oil can be used as a green solvent in many studies to eliminate petroleum-based solvents. Since tangerine peel is a complex source of different carotenoids separation and determination was performed by high-performance liquid chromatography (HPLC). In addition, the ability of ostrich oil and sunflower oil in carotenoid extraction from tangerine peel and carrot was compared. The highest yield of β-carotene extracted from tangerine peel using sunflower oil and ostrich oil were 75.741 and 88.110 (mg/L), respectively. Optimization of the process was achieved by response surface methodology (RSM) and the optimal extraction conditions were tangerine peel powder particle size of 0.180 mm, ultrasonic intensity of 19 W/cm2 and sonication time of 30 minutes.

Keywords : β-carotene, carotenoids, citrus peel, ostrich oil, response surface methodology, ultrasound-assisted extraction
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