Ultrasonics Sonochemistry 34 (2017) 821–830

Contents lists available at ScienceDirect

Ultrasonics Sonochemistry

journal homepage: www.elsevier.com/locate/ultson

Green ultrasound-assisted extraction of carotenoids from pomegranate wastes using vegetable oils

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ARTICLE INFO

Article history:
Received 4 April 2016
Received in revised form 12 July 2016
Accepted 26 July 2016
Available online 27 July 2016

Keywords:
Carotenoids
Green extraction
Green solvent
Pomegranate peel
Ultrasound extraction

ABSTRACT

The objective of this work was to develop a new process for pomegranate peels application in food industries based on ultrasound-assisted extraction of carotenoids using different vegetable oils as solvents. In this way, an oil enriched with antioxidants is produced. Sunflower oil and soy oil were used as alternative solvents and the effects of various parameters on extraction yield were studied. Extraction temperature, solid/oil ratio, amplitude level, and extraction time were the factors investigated with respect to extraction yield. Comparative studies between ultrasound-assisted and conventional solvent extraction were carried out in terms of processing procedure and total carotenoids content. The efficient extraction period for achieving maximum yield of pomegranate peel carotenoids was about 30 min. The optimum operating conditions were found to be: extraction temperature, 51.5 °C; peels/solvent ratio, 0.10; amplitude level, 58.8%; solvent, sunflower oil. A second-order kinetic model was successfully developed for describing the mechanism of ultrasound extraction under different processing parameters.