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A process for turning pomegranate peels into a valuable food ingredient using ultrasound-assisted extraction and encapsulation



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ABSTRACT

A new method for pomegranate peel application in food industries was developed based on the ultrasound-assisted extraction of phenolic compounds and their subsequent encapsulation by spray drying. The effects of various parameters on extraction yield, on encapsulation efficiency/yield, and on the main physical properties of the microcapsules (moisture content, bulk density, rehydration ability) were studied. Ultrasound was found to increase extraction yield, but mainly to shorten the treatment time by over 20 times. The maximum encapsulation efficiency was 99.80% and the optimum operating conditions were found to be: wall material, maltodextrin/whey protein isolate (50:50); inlet air temperature, 150 °C; drying air flow rate, 17.5 m³/h; ratio of wall to core material, 9/1; feed solid concentration, 30% (w/w). The encapsulated phenolic extract was found efficient in improving the shelf life of hazelnut paste, in spite of the limited solubility of the crude extract in such a high lipid content matrix.

Industrial relevance: Pomegranate peels, a by-product of pomegranate juice and concentrate industries, present a wide range of pharmaceutical and nutraceutical properties. Therefore, the peels could have more beneficial applications in food industries instead of being used as animal feed or in commercial cosmetic products. In this work, a new method for pomegranate peel application was developed based on the ultrasound-assisted extraction of phenolics and their subsequent encapsulation by spray drying.

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