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Use of ultrasound for osmotic dehydration. The case of potatoes



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ABSTRACT

In this work, ultrasound-assisted osmotic dehydration has been implemented as a method to reduce the dehydration time of potatoes. Potato cubes were dehydrated with four types of treatments: static osmotic dehydration, osmotic dehydration with agitation, osmotic dehydration with ultrasound application, and osmotic dehydration with ultrasound pretreatment. Sodium chloride and maltodextrin (12 DE) were used as osmotic agents. For each treatment, various variables were examined for their effect on water loss and solid gain. A microscopic analysis was carried out to evaluate the formation of microchannels and other changes to the potato tissue structure. The effective diffusivity was determined using the analytical solution of the Fick's second law taking into account the potato shrinkage. Ultrasound treatment resulted in higher moisture and solid mass transfer due to the breaking of cell structure as revealed by microstructure examination. At solute concentration of 30%, ultrasound-assisted osmotic dehydration enhanced the effective diffusivity of water by about 5.5–260%, whereas the ultrasound pretreatment in water increased the diffusivity during osmotic dehydration at solute concentration of 70% up to 130%.

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