

ANALYSIS OF MASS TRANSFER RATE AND EFFICIENCY OF OSMOTIC DEHYDRATION OF WILD GARLIC

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Abstract

The availability period of fresh wild garlic is very limited, only during the spring season. After harvest, the leaves quickly lose their sensory, nutritious and functional properties. The stability and availability of this valuable herb material can be extended by adequate drying technique. The aim was to evaluate the influence of used osmotic solution, process duration, temperature and mixing on the mass transfer rate and the efficiency of process on wild garlic.

The paper describes a study of osmotic dehydration of wild garlic (*Allium ursinum* L.) in sugar beet molasses and aqueous solution of sodium chloride and sucrose, at three different temperatures (20, 35, and 50 °C), with and without manual stirring in every 15 minutes. For this purpose, rate of water loss-RWL, rate of solid gain - RSG, rate of weight reduction - RWR and dehydration efficiency index - EI, were determined after 1, 2.5, and 4 hours of dehydration. In order to follow the mass transfer during the process, three key process variables were measured: moisture content, change in weight and change in dry matter, in accordance with Official Methods of Analysis (AOAC). Based on the obtained parameters RWL, RSG, RWR and EI were calculated. Principal component analysis (PCA) was applied to separate the samples according to the process parameters and characterize the observed samples.

Higher values of the observed parameters was achieved when the process was performed with agitation. Mass transfer was the most intensive at the beginning of the process, at temperature of 50 °C. RWL, RSG, RWR and EI decreased continuously from the first to the fourth hour, and after 2.5 hours showed a tendency to slow down. The highest value of EI was obtained by using molasses as osmotic solution, at 20 °C, after 2.5 hours of process, performed with agitation (5.59), and without agitation (5.27), which was also observed on the PCA biplot.

Mass transfer was the most intensive at the beginning of the process, decreased continuously from the first to the fourth hour, and after 2.5 hours showed a tendency to slow down. Therefore, processing time can be limited to 2.5 hours.

Key words: Osmotic dehydration, Wild garlic, Efficiency of dehydration, Mass transfer rate, PCA analysis.