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Determination of Sorption Isotherms for Shiitake Mushroom (*Lentinula edodes*) using the Dynamic Vapor Sorption Method

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Abstract

Lentinula edodes (shiitake) is one of the major edible cultivated mushrooms worldwide which is consumed either fresh or processed. Shiitake mushrooms are recommended as an addition to the daily diet due to their nutritional characteristics and medicinal properties. They contain a natural chemical compound called ergosterol which, when exposed to ultraviolet light is converted to vitamin D2. Different drying techniques such as solar tunnel dryers and hot-air cabinet dryers are frequently employed for the preservation of mushrooms. For the optimisation of the drying process and storage, the knowledge and understanding of sorption isotherms is essential. Although the static gravimetric method is still commonly used, automated instruments for the determination of sorption isotherms have been developed to overcome some of the drawbacks associated with the standard saturated salt solution method. The dynamic vapour sorption (DVS) is a relatively new technique designed to measure the weight change caused by adsorption or desorption of the water vapour at any desired relative humidity in a short period of time. The objective of this study was to validate and optimise the DVS method examining the moisture sorption behaviour of shiitake mushrooms at a temperature of 25°C. Furthermore, it was intended to compare the experimental equilibrium moisture content data obtained by the DVS method with the existing data for mushrooms in the literature. The samples were equilibrated in the range of 0.05–0.95 water activity using a DVS-1000 analyzer (Surface Measurement Systems Ltd., London, U.K.). The GAB equation was selected to fit the experimental data by non-linear regression analysis. The accuracy of fit was based on standard error, mean relative error, and coefficient of determination. Dynamic vapour sorption working isotherms were obtained in duplicate at a total of twelve target values of water activity. Moreover, the model predicted well the equilibrium moisture content of shiitake mushrooms. Sigmoid characteristic curves, type II pattern indicate a relatively small amount of water at low values of water activity exhibiting an asymptotic trend as water activity approaches 0.95. Data on moisture sorption isotherms were provided which is important for the optimisation of different processes in the food industry.

Keywords: Dynamic vapour sorption, *Lentinula edodes*, sorption isotherms

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