

Drying Kinetics of Vacuum Dried Beef Meat Slices

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Abstract : The vacuum drying behavior of beef slices (10 x 4 x 0.2 cm³) was experimentally investigated at the temperature of 60, 70, and 80°C under 25 mbar ultimate vacuum pressure and the mathematical models (Lewis, Page, Midilli, Two-term, Wangh and Singh and Modified Henderson and Pabis) were used to fit the vacuum drying of beef slices. The increase in drying air temperature resulted in a decrease in drying time. It took approximately 206, 180 and 157 min to dry beef slices from an initial moisture content to a final moisture content of 0.05 kg water/kg dry matter at 60, 70 and 80 °C of vacuum drying, respectively. It is also observed that the drying rate increased with increasing drying temperature. The coefficients (R²), the reduced chi-square (x²) and root mean square error (RMSE) values were obtained by application of six models to the experimental drying data. The best model with the highest R² and, the lowest x² and RMSE values was selected to describe the drying characteristics of beef slices. The Page model has shown a better fit to the experimental drying data as compared to other models. In addition, the effective moisture diffusivities of beef slices in the vacuum drying at 60 - 80 °C varied in the range of 1.05 - 1.09 x 10⁻¹⁰ m²/s. Consequently, this results can be used to simulate vacuum drying process of beef slices and improve efficiency of the drying process.

Keywords : beef slice, drying models, effective diffusivity, vacuum

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