

## Effects of Temperature and Thickness on Drying Kinetics of White Radish (*Raphanus sativus* L.) Slices

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### Abstract

In this study, white radish slices were dried as single layers with thickness of 2, 3 and 4 mm in the laboratory scale tray dryer at the temperature of 60, 70 and 80°C. The effect of drying air temperature and layer thickness on the drying characteristics was determined. The moisture content was decrease from 10.11±0.83 to 0.031±0.0014 g water g<sup>-1</sup> dry matter for 95 to 230 min. A non-linear regression procedure was used to fit experimental moisture loss data using five empirical models, namely, Newton, Henderson and Pabis, Page, Modified Page and Medilli *et al.*, model. The models were compared based on the coefficient of determination, mean relative percent deviation, root mean square error, and the reduced chi-square between the observed and predicted moisture ratios. The Medilli *et al.*, model has shown the better fit to the experimental drying data as compared to other models. Moisture transfer from radish slices was described by applying the Fick's diffusion model and the effective diffusivity ( $D_{eff}$ ) changes between  $1.22 \times 10^{-10}$  and  $9.73 \times 10^{-10}$  m<sup>2</sup> s<sup>-1</sup>. An Arrhenius relation with activation energy values are 53.79, 47.18 and 44.57 kJ\*mol<sup>-1</sup> for the thickness of 2, 3 and 4 mm, respectively. These energy values are expressed the effect of temperature and sample thickness on the diffusivity.

**Keywords:** Radish, Thin-layer drying, Effective diffusivity, Activation energy.

