

Abstract

Three different particular geometrical shapes of parallelepiped, cylinder and sphere were taken from cut green beans (length:diameter=1:1, 2:1 and 3:1) and potatoes (aspect ratio=1:1, 2:1 and 3:1) and peas, respectively. Their drying behaviour in a fluidised bed was studied at three different drying temperatures of 30, 40 and 50 °C (RH=15%). Drying curves were constructed using non-dimensional moisture ratio (MR) and time and their behaviour was modelled using exponential ($MR=\exp(-kt)$) and Page ($MR=\exp(-kt^n)$) models.

The effective diffusion coefficient of moisture transfer was determined by Fickian method using uni- and three-dimensional moisture movements. The diffusion coefficient was least affected by the size when the moisture movement was considered three-dimensional, whereas the drying temperature had a significant effect on diffusivity as expected. The drying constant and diffusivity coefficients were on the descending order for potato, beans and peas. The Arrhenius activation energy for the peas was also highest, indicating a strong barrier to moisture movement in peas as compared to beans and skinless cut potato pieces.