Vacuum Drying Mechanism, Kinetics and Thermodynamics of Plant Cell *Taxus chinensis*

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Abstract
In this study, we investigated the kinetics and thermodynamics of vacuum drying and dehydration of plant cell Taxus chinensis. At all the temperatures (45, 50, 55, and 60 °C), a large amount of the moisture was initially removed during the drying, and the drying efficiency increased when increasing the drying temperature. The experimental data were fitted to the Newton, Henderson and Pabis, Page, Modified Page and Geometric models. Comparison of results revealed that the Modified Page model could account for the adsorption isotherm data with the highest accuracy among the five drying models considered. The effective diffusion coefficient (3.6602 × 10-14 ~ 1.0981 × 10-13 m/s^2) and mass transfer coefficient (2.0181 × 10^{-12} ~ 9.6811 × 10^{-12} m/s) increased with increasing drying temperature. The small Biot number (2.3433 × 10^{-3} ~ 3.7470 × 10^{-3}) indicated that the process of mass transfer was externally controlled. The activation energy Ea of vacuum drying was found to be 73.07 kJ/mol. Thermodynamic parameters revealed the endothermic and spontaneous nature of drying.