

Kinetic and Thermodynamic Studies of the Microwave-Assisted Drying of Paclitaxel for Removal of Residual Methylene Chloride

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In this study, we investigated the kinetics and thermodynamics of microwave-assisted drying of paclitaxel for the removal of residual solvent, methylene chloride. The efficiency of microwave-assisted drying increased with increasing drying temperature. When the experimental data were applied to various kinetic models, the Newton model, Henderson and Pabis model, Page model, Modified Page model, and the Geometric model were acceptable. Among the kinetic models, the Page model and the Modified Page model were the most appropriate. The activation energy E_a of microwave-assisted drying was found to be 46.21 kJ/mol. The standard Gibbs free energy change was determined to be negative, while enthalpy change and entropy change were positive. These results indicate that this drying process was spontaneous, endothermic, and irreversible in nature. Acknowledgment This research was supported by Basic Science Research Program through the National Research Foundation of Korea (NRF) funded by the Ministry of Education, Science and Technology (Grant Number: 2015016271)