

## Kinetic and Thermodynamic Characteristics of Ultrasound-Assisted Extraction for Recovery of Paclitaxel from Biomass

하건수<sup>1,2</sup>, 김진현<sup>1,2,†</sup>

<sup>1</sup>공주대학교; <sup>2</sup>생물화학공학실험실

(jinhyun@kongju.ac.kr<sup>†</sup>)

This study developed an ultrasound-assisted extraction (UAE) process that can efficiently extract the anticancer agent paclitaxel from biomass. Most of the paclitaxel (~99%) was recovered from biomass by extracting once under the optimum ultrasound power (380 W) and operation time (10 min) for UAE. The kinetic analysis results revealed that the hyperbolic model was the most suitable with the highest accuracy among the four kinetic models considered. Significant correlations were found between the paclitaxel yield and the scalable ultrasonic process parameters of power density (P/V) and energy density (E/V). The thermodynamic analysis showed that the enthalpy change ( $\Delta H^{\circ}$ ) and entropy change ( $\Delta S^{\circ}$ ) were both positive, while the Gibbs free energy change ( $\Delta G^{\circ}$ ) was negative and decreased when increasing the temperature and ultrasound power. Thus, the extraction was more feasible when using a higher temperature and higher ultrasound power. The results indicated that the UAE process for recovering paclitaxel from biomass was endothermic, irreversible, and spontaneous.