

Thermodynamics of swelling equilibria for ternary system containing poly(N-isopropylacrylamide) hydrogel and poly(vinyl alcohol)

김성민, 배영찬^{1,*}
한양대학교; ¹한양대학교 화학공학과
(ycbae@hanyang.ac.kr*)

Using biocompatible poly(vinyl alcohol) (PVA) as a drug delivery model, we investigate the swelling behaviors of ternary system composed of cross-linked poly(N-isopropylacrylamide) (PNIPA) gel particle, water, and PVA. The value of swelling ratio in PVA9000 is larger than that of PVA89000 at the same composition because fully hydrolyzed PVA is acting as a steric hindrance. A lattice-based molecular thermodynamic framework was utilized for correlating binary liquid-liquid equilibria (LLE) to obtain interaction parameters, and the predetermined parameters from experimental conditions were then applied directly to describe the swelling behaviors of the gel particles. Using only one adjustable model parameter, we were able to theoretically predict PVA sorption in the gel network and ternary phase diagram for PNIPA (1)-water (2)-PVA (3) system at different temperatures. In addition, we were able to compare the calculated results with the experimental swelling data for PNIPA/PVA copolymer gel particles in water.