Numerical Analysis of Anionic Surfactant Adsorption on Activated Carbons in Fixed-Bed

김정희, Phillip Pendleton[1], 정용옥*
부경대학교; [1]University of South Australia
(jeongyo@pknu.ac.kr*)

This work investigates the adsorption characteristics due to adsorbent surface properties, adsorbate properties, and adsorption systems. The adsorbents were coconut-based, steam-activated carbon and wood-based, phosphoric acid-activated carbon. The adsorbates were dodecanoic acid (C_{12}) and octanoic acid (C_8).

A fixed-bed adsorption column was modeled with the liquid-phase mass balance equations, the solid-phase mass balance equations, and the Langmuir isotherm equations. The activated carbon with more hydrophobicity had larger adsorption capacity for C_8 and C_{12} . Also, the surface diffusion rates of C_8 and C_{12} became slower in the strong caustic solution. The longer molecular dimension of the surfactant led to a faster external mass transfer rate onto the activated carbons but a slower surface diffusion rate inside their narrow pores. On mixed component adsorption the external mass transfer coefficients and the surface diffusion coefficients of the anionic surfactants were consistent with those on single component adsorption, but on the adsorption system displacing C_8 by C_{12} the surface diffusion rate of C_{12} was slower than on single component adsorption.