



Adsorption of sulfamonomethoxine antibiotics to cucurbit[6]uril-anchored silica gel: effect of aqueous solution chemistry

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ABSTRACT

Cucurbit[6]uril-anchored silica gel (ACB[6]-SG) was used to adsorb sulfamonomethoxine (SMM) from aqueous solution. The performance of SMM adsorption onto ACB[6]-SG at 278, 288, 298, 308, and 318 K and the effects of various solution conditions were evaluated. The adsorption capacity of SMM on ACB[6]-SG increased as the cucurbit[6]uril content of ACB[6]-SG increased. The experimental isotherm data were analyzed using non-linear Freundlich and Henry isotherm equations with five error functions, namely the sum of the squares of the errors, the sum of the absolute errors, the average relative error, the hybrid fractional error function, and Marquardt's percent standard deviation. The error analysis showed that Freundlich model and Henry model described well the SMM adsorption data. Our thermodynamic investigation indicated that the adsorption of SMM onto ACB[6]-SG was a spontaneous and exothermic process. The adsorption was favorable in the pH range of 3.0–4.0. The adsorption affinity of SMM onto ACB[6]-SG increased after adding ions (in the form of NaCl, KCl, CaCl₂, or MgCl₂), suggesting the predominant role of the hydrophobic force.

Keywords: Sulfa drugs; Water treatment; Cucurbituril; Thermodynamic; Isotherm

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