Desalination and Water Treatment
www.deswater.com
doi: 10.1080/19443994.2013.833867

52 (2014) 7856–7865
December

Taylor & Francis
Taylor & Francis Group

Optimization of ultrasonic synthesis of N-succinyl-chitosan and adsorption of Zn^{2+} from aqueous solutions

Fang Li*, Chunmei Ding

Department of Biochemical Engineering, Anhui Polytechnic University, Wuhu 241000, China
Tel. +86 18817517716; Fax: +86 64252151; email: zls9390@163.com

Received 13 February 2013; Accepted 5 August 2013

ABSTRACT

N-succinyl-chitosan (N-NSC) was prepared by reacting chitosan (CS) with succinic anhydride (SA) under an ultrasonic radiation. The influences of three parameters (ultrasonic radiation power, mass ratio of SA to CS, and ultrasonic radiation time) on the degree of substitution (DS) of N-NSC were discussed and optimized with a response surface modeling. The optimum values of the above parameters for maximum value of DS were 118 W, 1.8:1, and 108 min, respectively. The adsorption performance of N-NSC for removing Zn^{2+} from aqueous solution was investigated in a batch system. Kinetic experiments data of that adsorption of Zn^{2+} onto N-NSC were fitted by pseudo-first-order, pseudo-second-order, and intraparticle diffusion kinetic models and the equilibrium isotherm data were described by six different isotherm equations. The adsorption follows pseudo-second-order kinetic model. The results demonstrate that the Langmuir equation is the best-fit model to describe the adsorption process with a maximum monolayer adsorption value of 135.41 mg/g, and Sips equation to predicit experimental value at an initial concentration of 100–700 mg/L, pH 5.0, and temperature 298 K.

Keywords: Chitosan; Succinylation; Ultrasonic radiation; Optimization; Adsorption; Zn^{2+}

*Corresponding author.