



Removal of Ca(II) from aqueous solutions by cellulose modified with calix[4]arene

Yanmei Zhou*, Xiaoyi Hu, Min Zhang, Xiaofeng Zhuo

Institute of Environmental and Analytical Sciences, College of Chemistry and Chemical Engineering, Henan University, Kaifeng, Henan 475004, P.R. China

Tel. +86 378 2868633 3422; Fax: +86 378 3881589; email: zhouyanmei@henu.edu.cn

Received 11 June 2012; Accepted 23 April 2013

ABSTRACT

An adsorptive composite was prepared for calcium ions removal. The chemically modified cellulose (EMC) was grafted with the vinyl monomer glycidyl methacrylate using ceric ammonium nitrate as initiator and was further derived with calix[4]arene. The structure of the modified cellulose was characterized by using Fourier transform infrared (FTIR), scanning electron micrographs (SEM), thermogravimetric analysis (TGA), and X-ray diffraction (XRD). Epoxy cellulose was found to contain 3.17 mmol g^{-1} epoxy groups by the acetone-hydrochloride titration method. The adsorption process of EMC was described by the Langmuir model of adsorption well, and the maximum adsorption capacity of calcium ions reached 104.16 mg g^{-1} . The kinetic studies revealed that the adsorption process followed the pseudo-second-order kinetic model.

Keywords: Adsorption; Modified cellulose; Calcium ion; Calix[4]arene; Removal

*Corresponding author.