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Preparation of composite aerogels based on sodium alginate, and its application in removal of Pb^{2+} and Cu^{2+} from water

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Abstract: A novel Ethylenediamine-Modified Calcium Alginate Aerogel (ECAA) was synthesized by freeze-drying method, and used to remove Pb^{2+} and Cu^{2+} from aqueous solutions. The prepared adsorbent was characterized by using the FTIR spectra, SEM analysis and XPS analysis. The effects of the pH, initial metal ion concentration, adsorption kinetics, and isotherms had been studied systematically. Moreover, the ECAA can be regenerated by simple acid treatment and used repeatedly. It is interesting to note that almost no Ca^{2+} can be detected after the first cycle that confirmed the adsorption process involves ion exchange. The XPS spectra analyses further indicated that Pb^{2+} and Cu^{2+} were adsorbed via the chelation of $-\text{CO}-\text{NH}$, $-\text{NH}_2$ and $-\text{OH}$. The results from these studies indicated the aerogel is a promising adsorbent to separate and recover the heavy metal ions from contaminated water.

Keywords: Adsorbent, Ethylenediamine, Aerogel, Alginate, Mechanism.

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