Public Abstract
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Arsenic Adsorption onto Iron-Chitosan Composite from Drinking Water
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The main purpose of this project was to develop an inexpensive adsorbent suitable for arsenic removal from drinking water. In this study, iron-chitosan based sorbents were selected to adsorb arsenic from aqueous solutions. Chitosan is a biopolymer derived from chitin, a polysaccharide and is available commercially in the form of flakes. To be used in an adsorption system, chitosan should be made in the form of a bead. In this process, two types of beads were prepared 1) Iron-chitosan (CFeN), and 2) Iron-chitosan coated perlite (CFeN+Perlite). Iron was added in the preparation of chitosan bead to enhance its adsorption capacity. These beads were characterized using Scanning Electron Microscopy (SEM), Energy Dispersive x-ray Spectrometry (EDS) and X-ray Photoelectron Spectroscopy (XPS). The results indicated that the beads were porous and iron dispersed, capable of arsenic adsorption. The primary adsorbent was iron-chitosan and the adsorption behavior of As for this adsorbent was determined.

Arsenic adsorption was best accomplished using CFeN bead as the adsorbent. Studies were carried out on both As(III) and As(V) removal from aqueous solutions. The adsorption isotherm studies of arsenic on CFeN beads could be described by the Langmuir model. The maximum adsorption capacities observed for arsenate are 4.85 (de-ionized water) and 3.13 (tap water) mg As/g CFeN bead, while for arsenite are 6.17 (de-ionized water) and 3.54 (tap water) mg As /g CFeN bead.

For CFeN adsorbent, high removals of arsenate are obtained at pH range 5.8 - 7.8, with maximum removal occurring around pH 5.8. Arsenite removal is also efficient with the maximum removal occurring around pH 8. The effects of competing anions can be minimized by lowering the pH to 5 before adsorption. From the isotherm studies it was found that the maximum adsorption of arsenate and arsenite onto iron-chitosan coated perlite was almost half that of iron-chitosan.