Materials Science and Engineering Doctoral Defense

Selenium Removal from Power Plant Waste Water with Solid Phase Extraction Materials

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abstract

As selenium is toxic at low levels, treatment methods to remove selenium from industrial waste waters are needed. In this work, we have investigated the effectiveness of three groups of sorbent materials for selenate and arsenate removal in spiked deionized (DI) water and waters collected from different locations at Salt River Project's Santan Generating Station in Gilbert, AZ: 1) novel nanostructured carbon-based materials, 2) layered double hydroxide (LDH)-based materials, and 3) biopolymer-based sorbents. Jar tests and rapid small scale column tests (RSSCT) were performed. From our studies, we found that well water could be more effectively treated than the blowdown and discharge waters. The biggest challenge for effective treatment using the sorbent materials was the high total dissolved solids and presence of competing anions, namely sulfate, in the water matrices. Removing sulfate using a pretreatment step (e.g. precipitation with barium salts) was investigated and found to be effective for improving the selenate removal capabilities.

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