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ACCEPTED MANUSCRIPT

High Concentration Arsenic Removal from Aqueous Solution Using Nano-Iron Ion Enrich Material (NIIEM) Super Adsorbent

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Abstract

Nano iron ion enrich materials (NIIEM) is a new commercial adsorbent employed to remove inorganic arsenic (As) toxicant from aqueous solutions. In this study, BET, SEM, EDX, XRF, XRD and TG-DTG were used to characterize this commercial adsorbent before and after contact with As(III)/As(V). NIIEM is composed mostly of core shell Fe^0 structure with an outer oxide and hydroxide shell. The SEM analysis of NIIEM after arsenic adsorption was characterized by the formation of agglomerates into larger particles (clusters). The XRD results revealed that NIIEM (Fe^0) were transformed to Ferrihydrite ($Fe_5O_7(OH).4H_2O$) corrosion products at high concentration of As(III)/As(V) under acidic conditions. The batch experiments conducted to describe the adsorption affinity of NIIEM depicted that its adsorption kinetics adopted a pseudo-second-order model with high affinity for both As(III) and As(V) at initial pH 2.5. Maximum adsorption capacity determined at initial pH 2.5 from the Langmuir-

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