

Arsenic(III) Removal from Aqueous Solutions by Adsorption onto Fly Ash

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Abstract : In the present study, the kinetics, equilibrium and thermodynamics of the adsorption of As(III) ions from aqueous solution onto fly ash (FA) was investigated in batch adsorption system. Prior to the adsorption studies, the FA was characterized by means of x-ray fluorescence (XRF), x-ray diffraction (XRD), scanning electron microscopy (SEM), transmission electron microscopy (TEM) and Brunauer-Emmett-Teller (BET) surface area determination. The effect of contact time, initial As(III) concentration, FA dosage, stirring speed, solution pH and temperature was examined on the adsorption rate. Experimental results showed a very good compliance with the pseudo-second-order equation, while the equilibrium study showed that the sorption of As(III) ions onto FA fitted the Langmuir and Freundlich isotherms. The adsorption process is endothermic and spontaneous, moreover, the maximum percentage removal of As(III) achieved with approx. 2.5 g FA mixed with 25 mL of 100 mg/L As(III) solution was 65.4 % at pH 10, 60 min contact time, temperature of 353 K and a stirring speed of 120 rpm.

Keywords : arsenic, fly ash, kinetics, isotherm, thermodynamics

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