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Demineralised Lignite Fly Ash for the Removal of Zn(II) Ions from Aqueous Solution

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ABSTRACT

Among the various possibilities of limiting the disposal of fly ashes (lignite), their reutilization as adsorbent materials is worthy of consideration. To this end, proper ashes beneficiation techniques can be put into practice. The adsorption of toxic compounds from industrial wastewater is an effective method for both treating these effluents and recycling lignite fly ash. The aim of this paper is to give a contribution for understanding the relationships among beneficiation treatments, adsorbent properties and adsorption mechanism and efficiency. In this context, the lignite fly ash was demineralised using concentrated HCl and HF (FA-DEM) and was used as adsorbent for Zn(II) ions from aqueous solutions. Batch experiments were carried out under various adsorbent dosages, pH, contact time and different metal ion concentrations. For FA-DEM, the 57.7% removal of Zn(II) ion was achieved under the optimum conditions of adsorbent dosages of 4 g/L, pH at 6, temperature at 303 K and the contact time of 1.15 h. The adsorption of Zn(II) ions onto FA-DEM followed the pseudo second order kinetics. The Langmuir isotherm model best represented the equilibrium data.

KEYWORDS

Fly Ash; Zn(II) Ion; Adsorption; Kinetics; Isotherm

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