Adsorption of Zn(II) ions from aqueous solution on lignite-fired fly ash

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ABSTRACT

Batch experiments were carried out under various adsorbent dosages, pH, contact time, and different metal ion concentrations. For fly ash before washing (BFA), under the optimum conditions of flyash dosages of 4 g L$^{-1}$ at pH 7, temperature at 303 K and contact time of 1 h, the removal of the Zn(II) was 8.3%. But for Fly ash after washing(AFA), under the optimum conditions of fly ash dosages of 4 g L$^{-1}$ at pH equal to 4, temperature at 303 K and contact time of 1 h, the removal of the Zn(II) was 57.3%. For both adsorbents, the adsorption of Zn (II) ions onto fly ash followed the pseudo-second-order kinetics. The Langmuir isotherm model well fitted to BFA and AFA adsorbents for the adsorption of Zn(II) ions compared with other isotherm models shows the monolayer homogeneous adsorption on both the adsorbents. A high percentage of removal of Zn(II) ion observed at pH 4 for the adsorbent AFA. The maximum removal of about 91.43% of Zn(II) ions was obtained at pH 4.0 for adsorbent dose of 1 g/50 mL of 100 ppm metal ion compared with BFA which was only 20.77% at the pH 7.

Keywords: Fly ash; Zn(II) ions adsorption; Kinetics; Isotherms

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