Adsorption of Reactive Blue 222 onto an industrial solid waste included Al(III) hydroxide: pH, ionic strength, isotherms, and kinetics studies

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\textbf{ABSTRACT}

In this study, an industrial waste sludge composed of metal hydroxides was used as a low-cost adsorbent for removing a reactive textile dye. Removal of the reactive dye Reactive Blue 222 (RB 222) onto an industrial solid waste included Al(III) hydroxides was studied using various parameters such as initial dye concentration, pH, electrolyte concentration, and agitation time. The maximum dye removal efficiency was obtained without pH adjustment in the study. The amount of dye adsorbed increased with increase in agitation time and it achieved to equilibrium at 90 min. The amount of dye adsorbed per unit weight of adsorbent values reduced in the dye solution with NaCl and Na\textsubscript{2}SO\textsubscript{4}. Adsorption equilibrium studies were employed to determine the adsorption capacity of the adsorbents by using Langmuir and Freundlich isotherm models. Freundlich model yielded better fit than the Langmuir model for the adsorption of RB 222 on waste metal hydroxide. The Langmuir adsorption capacity was found to be 18.38 mg dye/g adsorbent. Adsorption kinetics obeyed a second-order kinetic model.

Keywords: Adsorption; Metal hydroxide; Color removal; Reactive Blue 222

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