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Adsorptive properties of acid-heat activated rectorite for Rhodamine B removal: equilibrium, kinetic studies

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ABSTRACT

The acid-heat activated sodium rectorite (AH-R) was prepared and used to remove Rhodamine B (RhB) from aqueous solution. The AH-R showed higher adsorbility than the raw sodium rectorite and the rectorite modified by acid or by heat treatment. The effects of pH, adsorbent dosage, initial dye concentration, reaction temperature and ionic strength were studied. The Rhodamine B adsorption on the AH-R was a fast process and the equilibrium was reached in 60 min. The Langmuir and Freundlich isotherm models were applied to the equilibrium data and the Langmuir model was applied to the equilibrium data better. The maximun adsorption capacity was found to be 59.1 mg/g, and the kinetic data followed the pseudo-second-order kinetics. Thermodynamic parameters were obtained and it was found that the adsorption of Rhodamine B dye onto the AH-R was an endothermic and spontaneous process at the temperatures under investigation.

Keywords: Rectorite; Acid-heat activation; Rhodamine B; Low cost adsorbent; Adsorption capacity; Adsorption kinetics

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