



Integration of water treatment sludge and agriculture waste as low-cost adsorbent for Remazol red dye removal

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ABSTRACT

This study aims to investigate the potential of integrating water treatment sludge and rice husk (RH) as a low-cost adsorbent for Remazol red (RR) dye removal. In the first stage of the study, a comparison was made for thermally-treated conventional water treatment sludge and desalination water treatment sludge (DWTS) in terms of the characteristics and potential of the adsorbents in removing RR dye. DWTS seemed to be a better adsorbent and was selected to be integrated with RH for better properties and performance. The RH was treated with sodium hydroxide solution. The integrated adsorbent (RH-DWTS) was characterised using scanning electron microscopy, Fourier transform infrared, and X-ray diffraction. The performance of the adsorbents to remove RR dye was evaluated by carrying out batch adsorption experiments at different adsorbent dosages, initial dye concentrations, and pH. The highest removal rate of RR (81.2%) was achieved through adsorption using RH5%-DWTS at 1 g/L adsorbent dosage, 30 mg/L initial dye concentration, and pH 3. The adsorption study fitted well the Freundlich isotherm model, indicating heterogeneous adsorption. The results of this study can provide an essential pathway for developing sustainable and cost-effective dye wastewater treatment in the future.

Keywords: Adsorbent; Rice husk; Sludge; Dye removal; Adsorption

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