



Preparation, characterization and removal of hazardous reactive violet dye from aqueous solution using activated carbon and electroactive conducting polymer – a comparative study

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ABSTRACT

The present study investigates the feasibility of removing Reactive Violet 5 (RV5) from aqueous solution using two different adsorbents namely phosphoric acid activated carbon (PAC) and electroactive conducting polypyrrole coated sawdust (PPy/SD) prepared from *Casuarina* wood. The parameters like initial dye concentration, temperature, contact time and pH were evaluated and optimum experimental conditions were verified. The experiments were carried out using batch mode adsorption systems at 30°C, 35°C and 40°C. Surface morphology was studied through scanning electron microscopy. X-ray diffraction technique was used to analyze the nature of the adsorbent material. Adsorption of RV5 onto PAC and PPy/SD under different conditions was predicted using various kinetic models like pseudo-first-order, pseudo-second-order, intraparticle diffusion and Elovich models. The experimental data were also analyzed by Langmuir, Freundlich, D–R and Temkin isotherm models. The adsorption isotherm data for RV5 were best fitted to the Langmuir isotherm. The maximum monolayer adsorption capacity was found to increase from 10.39 to 12.35 mg/g for PAC and 11.19 to 13.59 mg/g for PPy/SD on increasing the temperature from 30°C to 40°C which accounts for the endothermic nature of the process. The results revealed that PPy/SD can act as an excellent adsorbent than PAC for removal of anionic dye namely RV5.

Keywords: Phosphoric acid activated carbon; Electroactive conducting polymer; Reactive Violet; Batch mode adsorption; Intraparticle diffusion; Adsorption isotherm

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