COIR PITH ACTIVATED CARBON FOR THE REMOVAL OF DYES, ORGANICS AND HEAVY METALS FROM AQUEOUS SOLUTIONS

by

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DECLARATION

I certify that this thesis does not incorporate without acknowledgement any material previously submitted for a degree or diploma in any university and to the best of my knowledge and belief it does not contain any material previously published, written or orally communicated by another person except, where due reference is made in the text.

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ABSTRACT

Adsorption of textile dyes, organics and heavy metals onto coir pith based adsorbents from aqueous solutions were studied. Raw coir pith and thermally activated coir pith at 700^{0}C were used as adsorbents. Batch experiments showed that both adsorbents are capable of binding appreciable amounts of impurities from aqueous solutions. Thermally activated coir pith was superior to raw coir pith for dyes and phenol removal. Heavy metal adsorption capacities for both adsorbents were similar. Batch adsorption experiments were conducted in detail for dye removal to determine the factors affecting adsorption and kinetics of the process. Fixed bed column experiments were performed to study practical applicability and breakthrough curves were obtained. The maximum adsorption was observed at solution pH values between 5-9 for Methylene blue and Malachite green. Solution pH value of 2 showed maximum adsorption for Nylosan blue. The adsorbent to solution ratio and the dye concentration in the solution affect the degree of dye removal. The equilibrium data were satisfactorily fitted to Freundlich isotherm. The kinetic data fits to pseudo second order model and kinetic parameters were calculated. Column experiments showed 'S' shaped breakthrough curves and the results followed Bed Depth Service Time (BDST) model. Fixed bed adsorption capacities were lower compared to batch experiments.