



Batch Adsorption of Phenol by improved Activated *Acacia nilotica* branches char: Equilibrium, Kinetic and Thermodynamic studies

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Abstract: Improved activated char of acacia nilotica branches (CANBI) was prepared by reforming in thermo-chemical treatment on powdered acacia nilotica branches. This process enhanced its overall surface area, percentage fixed carbon content, iodine number and methylene blue adsorption. SEM analysis on this adsorbent explained its highest BET surface area of 403m²/g compared to that of other two adsorbents. Experimentally adsorption capacity of this char is established to be 250 mg/g which is much higher than other two adsorbents. Study of phenol sorption was done to optimize carbon dosage, pH of adsorbate-adsorbent system, contact time, initial phenol concentration and rpm of shaker. Adsorption equilibrium model of Langmuir, Freundlich, Temkin and Dubinin Radushkevich fitted well for phenol concentration range of 0 to 975 mg/l and all models established, high affinity of phenol towards CANBI. Kinetic data represented pseudo second order kinetics better. Thermodynamic study confirmed the phisibility of adsorption process. Regeneration of CANBI was also successfully tested by various acidic and basic eluents. CANBI has been proved to be cheaper and renewable adsorbent.

Key Words: Acacia nilotica branches, Activated carbon, Adsorption, Equilibrium, Kinetics and Thermodynamics.

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