PHENOL ADSORPTION ONTO HIGH SURFACE AREA ACTIVATED CARBON PREPARED FROM AGRICULTURE WASTE FOX NUTSHELL BY CHEMICAL ACTIVATION WITH H3PO4: BATCH AND FIXED BED STUDIES

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Abstract

High surface area activated carbon (FNAC) prepared from Fox nutshell with H3PO4 activating agent is utilized for removal of phenol from aqueous solution. The prepared FNAC has high surface area of 2638 m² g⁻¹ and total pore volume of 1.53 cm³ g⁻¹ with 86.27 % micropores and average pore diameter of 2.32 nm. FNAC exhibited high adsorption capacity of 83.21 mg g⁻¹ to phenol uptake. Pseudo second order kinetics and Freundlich isotherm model best fit to the experimental data. Fixed bed study resulted in highest capacity of 75.64 mg g⁻¹ at 100 mg l⁻¹ initial phenol conc., 4 cm bed height and 5 ml min⁻¹ flow rate.

Methodology

Fig.1. FESEM images of the Fox nutshell and FNAC

Results

Fig. 3. % removal of phenol at different initial concentrations; mass of adsorbent: 0.5 g; phenol conc.: 100mg/L, pH 2.8, Temp.: 25 ºC.

Fig. 4. Effects of contact time on the adsorption capacity at different initial concentrations; mass of absorbent: 0.5 g; phenol conc.: 100mg/L, pH 2.8, Temp.: 25 ºC.

Conclusion

High surface area activated carbon (FNAC) prepared from Fox nutshell with H3PO4 activating agent is found to be an extremely promising material for the successful removal of contaminant such as phenol from the wastewater. The phenol adsorption is physical one and exothermic in nature.

Selected References


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