
Preparation of chemically activated Carbons using agrowastes and investigation of their surface properties

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Freundlich and Langmuir adsorption isotherms were used to model the equilibrium adsorption data obtained for adsorption of methylene blue (MB) at 27, 60, 80 and 90°C on activated carbons (AC) produced from different agrowastes; teak saw dust (TSAC), rice husk (RHAC) and coconut shells (CAC) by chemical activation using ortho-phosphoric acid at 850, 500 and 450°C respectively. The Langmuir isotherm parameters, X_m and K and the Freundlich isotherm parameters, K_f and n were determined from the adsorption equilibrium data for the above samples. Also other important parameters such as carbonization yield, ash content, volatile matter content, methylene blue number (MBN) and iodine number (IN) were determined for each activated carbon sample. The equilibrium MB adsorption data of all the AC samples fitted well to Freundlich and Langmuir models except for TSAC and RHAC at 27°C. The type of adsorption of MB on all the AC samples is found to be activated chemisorption. Teak saw dust was found to be a viable raw material for the preparation of activated carbon since the maximum adsorption capacity towards both methylene blue and iodine was achieved with it compared to RHAC and CAC. TSAC has the best developed micro pore structure in comparison with the same of RHAC and CAC. The results of FTIR strongly support significant chemical changes occurring due to phosphoric acid treatment in production of all ACs by giving evidence for the presence of OH, carbonyl C=O, -C-O-, R-OH and P=O functional groups.

Key words: Adsorption isotherms, Methylene Blue, Activated carbon, Agrowastes

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