

# African Star Apples Whole Seed Activated Carbon Powder as a Bio-adsorbent of Crystal Violet Dye Removal from Aqueous Solution

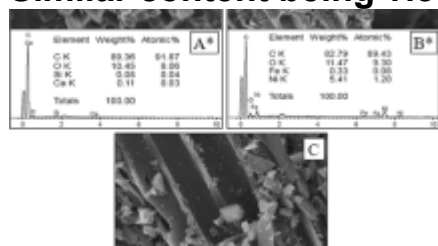
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- Samuel E. Sanni

## Abstract

Investigation shows that African star apple (ASA) whole seed has the potential to eliminate crystal violet (CV) dye from aqueous solutions. Batch adsorption studies were performed to show some parameters, which include temperature, amount of adsorbent, pH, dye concentration and dosage with respect to contact time. The characterization was experimented on the adsorbent with respect to a scanning electron microscope (SEM) and Fourier transform infrared (FT-IR). Langmuir, Freundlich, Temkin, Flory-Huggins model and Dubinin-Radushkevich (D-R) isotherms were analysed using an acidic solution of pH 3.0. Langmuir and D-R models gave better fit than others. Thermodynamic variables such as entropy ( $\Delta S_{ads}$ ), Gibbs free energy ( $\Delta G_{ads}$ ) and enthalpy ( $\Delta H_{ads}$ ) suggest that adsorption is spontaneous, making the process endothermic in nature. The kinetics model also describes the adsorption of the dye on the adsorbent by pseudo-first order, Elovich and pseudo-second order equation. Attainment of equilibrium was achieved in 5 h for the amount of dye adsorbed at pH of 8. Column adsorption was made for bulk removal of dye using eluting NaCl solution, thereby recovering 94% of the dye.

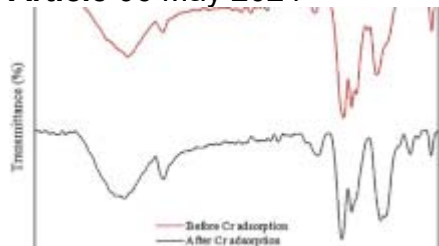
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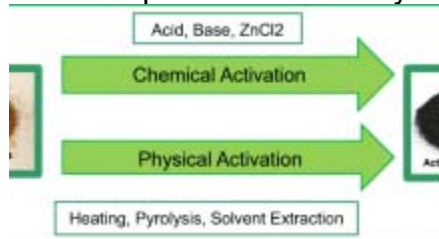
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