

## Removal of hazardous dye from synthetic textile dyeing and printing effluents by *Archis hypogaea* L. shell: a low cost agro waste material

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### ABSTRACT

The sorption of Safranin onto the *Archis hypogaea* L. (groundnut) shell (GNS) has been studied in terms of pseudo first order, pseudo second order, Elovich and intraparticle diffusion chemical sorption processes. The batch sorption model, based on the assumption of a pseudo second order mechanism has been used to predict the rate constant of sorption and the equilibrium capacity with the effect of mass of adsorbent, initial dye concentration, pH and contact time. The rates of sorption were found to be conforming pseudo second order kinetics with good correlation. Batch isotherm studies for sorption of Safranin on *Archis hypogaea* L. shell (GNS) were described by Freundlich and Langmuir isotherm equation. In adsorption isotherms, Langmuir isotherm fits well with experimental data having  $r^2 > 0.9956$ . The maximum adsorption capacity observed was 172.14 mg/g. The values of dimensionless separation factor  $R_L$  are  $0 < R_L < 1$  indicating that favorable adsorption. The adsorbent was also characterized by FTIR, XRD and SEM analysis.

**Keywords:** Adsorption kinetics; Dye removal; Safranin; *Archis hypogaea*; Isotherm; Biosorption

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