



## Response surface methodology approach for optimization of adsorption process for the removal of Indosol Yellow BG dye from aqueous solution by agricultural waste

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### ABSTRACT

This study was designed to explore the adsorption capacity of agricultural waste biomass for the removal of Indosol Yellow BG dye from aqueous solutions. Screening test was performed to select one adsorbent with maximum adsorption potential. Peanut husk biomass was selected as potential adsorbent after screening test. Peanut husk biomass depicted maximum adsorption capacity (22.47 mg/g) as compared to other adsorbents (sugarcane bagasse, corncobs, cotton sticks, and sunflower). The effect of different physical and chemical treatments on the adsorption capacity of peanut husk biomass was investigated, and acetic acid-treated biomass depicted very good adsorption capacity (25.05 mg/g) for the removal of Indosol Yellow BG dye. Box–Behnken experimental design was used for batch study. Batch experiments were conducted to explore the effect of three important process parameters viz., initial dye concentration, adsorbent dose, and pH. Maximum dye removal (58.01 mg/g) was achieved at 200 mg/L initial dye concentration, 2 pH, and 0.17 g adsorbent dose. Higher initial dye concentration, lower pH, and lower biosorbent dose were found to be feasible conditions for maximum dye removal. Desorption study was also conducted by using different concentrations of NaOH, and maximum desorption (44.5%) was achieved with 1 M NaOH solution. The results indicated that acetic acid-treated peanut husk biomass could be used as potential adsorbent for the treatment of dye containing wastewater.

*Keywords:* Agricultural wastes; Peanut husk; Pretreatments; Indosol Yellow BG; Box–Behnken experimental design; Desorption study

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