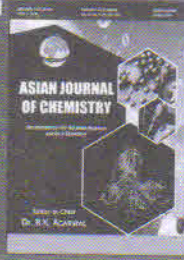


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Study on Adsorption Efficiency of Low-Cost Hemp Seed Oil Cake (*Cannabis sativa* L.) as Adsorbent for the Removal of Reactive Black 5 Dye from Aqueous Solution

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Driven by the need for sustainable and economical water treatment solutions, this study explores the use of agricultural byproduct adsorbents, specifically hemp seed oil cake (HSOC), for the removal of reactive black 5 (RB5) dye. Batch experiments identified the ideal conditions for the adsorption process, resulting in a maximum removal efficiency of 99.94%. The process, identified as spontaneous and exothermic through thermodynamic analysis, was most effective under the following conditions: an initial RB5 dye concentration of 10 mg/L, 1.5 g of HSOC adsorbent, a pH of 4 (acidic condition), 45 min of contact time, 100 rpm agitation and a temperature of 50 °C. These results collectively affirm HSOC's promise as a highly efficient, bio-based material for the remediation of dye-contaminated water.

Keywords: Adsorption, Hemp seed oil cake, Reactive black 5, Textile effluent, Water treatment.