

## Application of Synthetic Monomers Grafted Xanthan Gum for Rhodamine B Removal in Aqueous Solution

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**Abstract :** The rapid industrialisation and population growth have led to a steady fall in freshwater supplies worldwide. As a result, water systems are affected by modern methods upon use due to secondary contamination. The application of novel adsorbents derived from natural polymer holds a great promise in addressing challenges in water treatment. In this study, the UV irradiation technique was used to prepare acrylamide (AAM) monomer, and acrylic acid (AA) monomer grafted xanthan gum (XG) copolymer. Furthermore, the factors affecting rhodamine B (RhB) adsorption from aqueous media, such as pH, dosage, concentration, and time were also investigated. The FTIR results confirmed the formation of graft copolymer by the strong vibrational bands at  $1709\text{ cm}^{-1}$  and  $1612\text{ cm}^{-1}$  for AA and AAM, respectively. Additionally, more irregular, porous and wrinkled surface observed from SEM of XG-g-AAM/AA indicated copolymerization interaction of monomers. The optimum conditions for removing RhB dye with a maximum adsorption capacity of  $313\text{ mg/g}$  at  $25^{\circ}\text{C}$  from aqueous solution were pH approximately 5, initial dye concentration =  $200\text{ ppm}$ , adsorbent dose =  $30\text{ mg}$ . Also, the detailed investigation of the isothermal and adsorption kinetics of RhB from aqueous solution showed that the adsorption of the dye followed a Freundlich model ( $R^2 = 0.96333$ ) and pseudo-second-order kinetics. The results further indicated that this adsorbent based on XG had the universality to remove dye through the mechanism of chemical adsorption. The outstanding adsorption potential of the grafted copolymer could be used to remove cationic dyes from aqueous solution as a low-cost product.

**Keywords :** xanthan gum, adsorbents, rhodamine B, Freundlich

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