**Abstract**

Environmental contaminants are hazardous to living organisms and human societies. which has intrigued the interest of environmental researchers. Ciprofloxacin contamination has become a major concern due to its negative health effects and the emergence of antimicrobial resistance genes. This study examined the removal of pharmaceutical contaminants such as ciprofloxacin by using chitosan-based hydrogel. Additionally, modified hydrogel shows better results 99% as compared to unmodified hydrogel. Ciprofloxacin from pharmaceutical wastewater was effectively removed by using chitosan-based hydrogel. Initial concentration, pH, temperature, and contact time had a great influence on the removal of Ciprofloxacin. The chemical and physical characteristics and structural morphology of synthesized hydrogel films were studied by using SEM, FTIR, and XRD analysis. The maximum removal efficiency was attained at a concentration of 40mg/L with pH =8 and an adsorbent dose of 0.05g as well as at an optimal temperature of 25 and 99.5% in 120 min. Furthermore, the maximum removal efficiency of 95 % for ciprofloxacin using chitosan-based hydrogel film was achieved with an initial concentration of 20mg/L and an adsorbent dose of 0.05g with an optimum temperature of 25°C in 60 min. The pseudo-second-order (R2 =1) and Langmuir (R2 = 0.999) models provide the best-fitted model for ciprofloxacin adsorption isotherm analysis. According to the Langmuir isotherm model, the chitosan-based hydrogel maximum monolayer adsorption capacity was 637.3mg/g. These findings imply that chemisorption was primarily responsible for ciprofloxacin adsorption. Ultimately, the chitosan-based hydrogel is an efficient, recyclable, and low-cost adsorbent for removing antibiotics (ciprofloxacin) from pharmaceutical wastewater.