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Topic of Research**:** **Removal of Pollutants from aqueous solution using clay-hydrogel Nanocomposites**

Findings

This thesis detailed the fabrication of various clay-hydrogel nanocomposites such as Polyacrylamide/bentonite hydrogel nanocomposite, Poly(methacrylic acid)/montmorillonite hydrogel nanocomposite, Itaconic acid/ kaolin hydrogel nanocomposite, Gum tragacanth/ bentonite hydrogel nanocomposite and Pullulan/kaolin hydrogel nanocomposite. These synthesized hydrogel nanocomposites were exploited as adsorbents for Pb^{2+}, Cd^{2+}, Amoxicillin, diclofenac, Metformin, Aspartame, and paracetamol contaminants from aquatic phase with corresponding adsorption capacities of (138.33, 200.81, 156.65, 152.86, 278.35, 392.04, 332.54 mg/g, respectively. The hydrogel nanocomposites were characterized by various spectroscopic techniques like Fourier Transform infrared spectroscopy (FTIR),X-ray diffraction (XRD), X-ray photoelectron spectroscopy (XPS), Transmission electron microscopy (TEM), scanning electron microscopy (SEM), and energy dispersive X-ray spectroscopy (EDX) Non-linear isotherm and kinetic modelling were employed to appraise the equilibrium data. Reusability and real water analysis demonstrated that these adsorbents can be used for practical purposes. The adsorption of these pollutants onto the synthesized clay-hydrogel nanocomposite occurs via different mechanisms that include, Hydrogen bonding, electrostatic, van der Walls n-π, and π-π interactions.