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Topic of Research**:** **Ferrite based magnetic composite materials for the removal of hazardous pollutants from water**

Keywords: Magnetic Nanocomposites, Adsorption, Wastewater treatment, Surface Interactions, Organic pollutants

Findings

This thesis detailed the fabrication of various magnetic nanocomposites such as *Ocimum sanctum*-Fe_3O_4 magnetic nanocomposite (OSIO), *Ocimum sanctum*-$CoFe_2O_4$ magnetic nanocomposite ($CoFe_2O_4$/OS), *Peanut shell*-$CuFe_2O_4$ magnetic nanocomposite ($CuFe_2O_4$/PS), *Activated Teawaste*-$ZnFe_2O_4$ magnetic nanocomposite" $ZnFe_2O_4$/TW. These synthesized nanocomposites were exploited as adsorbents for Methylene blue, Crystal violet, Bismarck brown, Coomassie blue, Celestial blue contaminants from aquatic phase with corresponding adsorption capacities. The magnetic nanocomposites were characterized by different 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), Vibrating Sample Magnetometer (VSM) and energy dispersive X-ray spectroscopy (EDX). The linear isotherm and kinetic modeling were employed to appraise the equilibrium data. The Reusability analysis demonstrated that these adsorbents can be used for practical purposes. The adsorption ofthese pollutants onto the synthesized magnetic nanocomposite occurs via different mechanisms that include, electrostatic, Hydrogen bonding, van der Walls, and π-π interactions.