# Synthesis and characterization of functionalized polyacrylonitrile coated with iron oxide nanoparticles and its applicability in nitrate removal from aqueous solution

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## ABSTRACT

A novel adsorbent, Polyacrylonitrile (PAN)-oxime-nano-$Fe_2O_3$, was developed to remove nitrates from water. The properties of the adsorbent were characterized by transmission electron microscopy, X-ray diffraction, and Fourier transform infrared spectroscopy. Experiments were carried out to investigate the adsorption kinetics and desorption behaviour of the adsorbent. The Langmuir, Freundlich, and Dubinin–Radushkevich (D–R) isotherms were determined and the results revealed that the adsorption was well explained by the (D–R) model. The experimental data fitted very well the pseudo-second-order kinetic model. Intra-particle diffusion affects nitrate uptake. The experiments showed that the maximum amount of nitrate released after desorption processes was about 50%, indicating that a large portion of nitrate was irreversibly retained by the PAN-oxime-nano-$Fe_2O_3$.

*Keywords:* Polyacrylonitrile; Nano-$Fe_2O_3$; Adsorption isotherms; Kinetics

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