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Aminated-Fe₃O₄ nanoparticles filled chitosan/PVA/PES dual layers nanofibrous membrane for the removal of Cr(VI) and Pb(II) ions from aqueous solutions in adsorption and membrane processes

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Abstract

In the present study, dual layers mixed matrix membranes (MMMs) were prepared by incorporating aminated-Fe₃O₄ nanoparticles into the chitosan/polyvinyl alcohol nanofibers over the polyethersulfone (PES) membrane for the removal of Cr(VI) and Pb(II) ions in batch adsorption and membrane processes. The synthesized aminated- Fe₃O₄ nanoparticles were characterized using XRD, FESEM and FTIR analysis. The morphology and roughness of membranes were determined using SEM, TEM and AFM analysis. The effect of adsorption operating parameters such as pH (2-7), contact time (0-60 min), initial concentration of metal ions (20-1000 mgL⁻¹) and temperature (30-50 °C) on the Cr(VI) and Pb(II) ions sorption was studied. Kinetic models including pseudo-first-order, pseudo-second-order and intra-particle diffusion models were used to describe the kinetic data of metal ions sorption using nanofibrous

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