عنوان مقاله:

Polyether Sulfone-Graphene Oxide- Polyvinyl Pyrrolidone Nanocomposite Adsorptive Membrane for Arsenic Removal from Wastewater

محل انتشار:

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خلاصه مقاله:

Arsenic contamination poses a major public health concern and harms the environment with its toxicity. Long term exposure to a high concentration of arsenic is harmful to human health as well as the environmental biodiversity. This study is aimed to fabricate and investigate the possibility of polyethersulfone-graphene oxide-polyvinyl pyrrolidone (PES-GO-PVP) nanocomposite adsorptive membrane and use it to enhance the removal of arsenic from wastewater. The nanocomposite membrane in this study was fabricated via the non-solvent induced phase separation (NIPS) method with the addition of polyvinylpyrrolidone (PVP) as a pore-forming agent. Based on the characterization results of GO through Fourier-Transform Infrared Spectroscopy (FTIR), X-ray diffraction (XRD) and Raman spectroscopy, the existence of high quantity of oxygen based functional groups with high degree of oxidation was observed, which indicated that the GO were well-synthesized. The characterization of the membrane indicated that the addition of GO and PVP could impact the membrane hydrophilicity and mechanical stability. Three adsorption parameters (initial concentration of arsenic, pH and contact time) were then optimized using a face-centred central composite design (FCCCD). The arsenic removal efficiency of ۸۸.۶ % was obtained with ۵۵ mg/L of initial arsenic concentration, at pH ۸ and ۷۵ minutes of contact time between PES-GO-PVP membrane and the arsenic ion. The Langmuir isotherm model fitted the equilibrium data, describing the monolayer adsorption mechanism occurred on the surface of the membrane. Therefore, the results obtained in this study prove the suitability and promising potential of the nanocomposite membrane for effective removal of arsenic through adsorption.

کلمات کلیدی:

Graphene oxide-based membrane, Characterization, Adsorption, Optimization, Adsorption isotherm