GO-PES Membrane for Industrial Dye Effluent Water Purification

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Clean water scarcity is a major global issue, posing significant challenges for both the environment and human health. A major concern in industrial wastewater management is the presence of elevated concentrations of dyes in water systems. Graphene-based nanomaterial membranes offer a proactive solution, effectively removing industrial dye contaminants from water. The intrinsic two-dimensional structural attributes and remarkable properties exhibited by graphene and graphene oxide (GO) provide opportunities for their integration into nanoporous materials. When combined, these materials offer modifiable characteristics, enabling fine-tuning for enhanced efficacy in water filtration applications. Utilizing a pressure-assisted technique, synthesized GO-PES (GO-Polyether Sulfone) nanoporous membranes demonstrate heightened efficacy in the removal of Methylene Blue (MB) and Methyl Orange (MO), excelling particularly in key parameters such as membrane selectivity and permeation flux. In this study, industrial dye filtration membranes were synthesized using four different concentrations of graphene oxide (GO) to modulate the amount of GO incorporated. The results reveal notable trends: for MB, selectivity increased from 65.1% to 72.4% as GO concentration rose, while flux decreased from 0.03332 to 0.01806 m3/m2s. Similarly, for MO, selectivity increased from 47.9% to 72%, with flux decreasing from 0.02968 to 0.01851 m3/m2s.

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