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A method for alkali hydrolysis modification of PAN/PES/TiO_2 composite ultrafiltration membranes

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ABSTRACT

In this work, we prepared polyacrylonitrile/polyethersulfone/TiO_2 (PAN/PES/TiO_2) composite ultrafiltration membranes using the immersed phase conversion method and used alkali hydrolysis modification to prepare a modified ultrafiltration membrane with high water flux, good hydrophilicity, and excellent anti-pollution properties. The composite ultrafiltration membrane was characterized by an infrared spectrometer, differential scanning calorimeter, scanning electron microscope, contact angle tester, UV spectrophotometer, membrane performance evaluation instrument, and other characterization means to perform a full range of performance tests. The results showed that the water flux of the prepared PAN/PES/TiO_2 composite ultrafiltration membrane was as high as 619.4 L/m^2·h, and the rejection rate of bovine serum albumin was 95.78%, which reached the ideal level. In this study, PAN/PES ultrafiltration membrane, PAN/PES hydrolysis membrane, PAN/PES/TiO_2 ultrafiltration membrane, and PAN/PES/TiO_2 hydrolysis ultrafiltration membrane were also tested for anti-pollution stability and filtration flux stability in comparison. The final test results showed that the PAN/PES/TiO_2 hydrolysis ultrafiltration membrane had excellent anti-pollution stability and performed the best in long-term flux. The final results showed that PAN/PES/TiO_2 hydrolyzed ultrafiltration membranes had excellent anti-pollution stability and performed best in long-term flux stability tests.

Keywords: Ultrafiltration membrane; Anti-pollution; Alkali hydrolysis; TiO_2 nanoparticles; Polyacrylonitrile

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