Chemical Engineering Thesis Defense

TESTING WATER DESALINATION USING ELECTROSPUN ZWITTERIONIC POLYSULFONE OVER POLYSULFONE MEMBRANES

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Abstract

Water scarcity is a critical and serious worldwide concern that needs prompt and effective action, with a focus on sustainability and environmental considerations. The expanding difference between consumption and water withdrawal rates can be attributed, in part, to rising populations and increased demand. Freshwater may be obtained from several sources, such as rivers, lakes, and aquifers, as well as through alternative means such as rainwater collection and desalination of seawater. The utilization of membrane separation technology has been regarded as a cost-effective and energy-efficient solution for the process of water filtration. The utilization of electrospun fibrous membranes has garnered significant attention in the field of membrane filtering applications owing to their notable attributes of large surface area and porosity. To develop a high-performance water filtration membrane, a novel zwitterionic functionalized polysulfone was electrospun to bead-free fibers on polysulfone membranes. The zwitterionic polysulfone was successfully electrospun on the polysulfone membrane and thermally pressed at the above glass transition temperature to improve the properties of the membrane. The aim of this work is to test the electrospun zwitterionic polysulfone membrane by electrospinning it on a commercial polysulfone support. The electrospinning method was studied using different polymer concentrations and electrospinning conditions. Scanning electron microscopy was used to study the porosity and diameter size of the fiber. TGA-ASSAY method was used to study the difference in water uptake ratio of the polysulfone membrane with and without the electrospun fiber. Tensile study and water contact angle were also studied. The results showed an improvement in polysulfone membrane with electrospun zwitterionic polysulfone membrane.

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