



Design optimization of ultrafiltration membrane module for desalination applications

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ABSTRACT

Ultrafiltration (UF) membrane provides an effective means of removing particles and microbial contaminants by size exclusion with the requirement of smaller footprints with conventional pretreatment processes. Although a few works have been done to optimize UF membrane modules and systems for drinking water treatment and membrane bioreactor (MBR), little information is available on UF design for pretreatment of seawater/brackish water desalination. This study focuses on the design of hollow fiber UF membrane modules for pretreatment processes in desalination plants. A theoretical model was developed and applied to predict the filtration efficiency of hollow fiber UF membranes. Typical conditions for pretreatment of feed solution to reverse osmosis desalination were considered. The effect of module dimensions and fiber packing density on pressure drops was also analyzed using the model. It was found that fiber thickness and module size are important as well as inner diameter and length of the fiber.

Keywords: Desalination; Pretreatment; Ultrafiltration; Module; Design; Optimization

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