

亲水聚四氟乙烯膜膜蒸馏抗污染性能研究
**Study on Anti-pollution Performance of Hydrophilic Poly tetra
fluoro ethylene Membrane Distillation**

摘 要

随着对饮用水需求的不断增加和全球日渐加剧的水污染，缺水问题迫使科学家们开发出高效的技术来实现海水淡化，膜蒸馏由于能耗较低，反应条件温和等优点而备受关注。聚四氟乙烯膜是很好的膜蒸馏用材料，疏水性好，但容易吸附有机物造成膜污染。对膜表面进行亲水改性可以提高膜的抗污染性能。

本文采用聚多巴胺在聚四氟乙烯微孔膜表面制备了亲水涂层，并研究其膜蒸馏抗污染性能。采用漂涂和浸涂的方法制备两种亲水改性膜，通过扫描电镜、孔结构测定仪和接触角测定仪等仪器表征了膜形貌、孔结构及亲水性能。含油盐溶液膜蒸馏实验表明，浸涂膜的最大通量达到 $11.15\text{kg}/(\text{m}^2\cdot\text{h})$ ，漂涂膜最大通量为 $9.64\text{kg}/(\text{m}^2\cdot\text{h})$ ，而未经处理的原膜最大通量只有 $2.78\text{kg}/(\text{m}^2\cdot\text{h})$ 。

关键词：聚四氟乙烯膜 亲水改性 膜蒸馏 抗污染

Abstract

With the increasing demand for drinking water and the increasing global water pollution, water shortage has forced scientists to develop efficient technologies to realize seawater desalination. Membrane distillation has attracted much attention due to its low energy consumption and mild reaction conditions. Polytetrafluoroethylene (PTFE) membrane is a good material for membrane distillation, with good hydrophobicity, but it is easy to adsorb organic matter and cause membrane fouling. Hydrophilic modification of the membrane surface can improve the anti-fouling performance of the membrane.

In this paper, the hydrophilic coating was prepared on the surface of PTFE microporous membrane by polydopamine, and the anti-fouling performance of membrane distillation was studied. Two hydrophilic modified membranes were prepared by coating and dipping. The morphology, pore structure and hydrophilicity of the membranes were characterized by scanning electron microscopy, pore structure analyzer and contact angle analyzer. The experimental results of membrane distillation in oil-salt solution showed that the maximum flux of immersion membrane was $11.15\text{kg}/(\text{m}^2 \text{ h})$, and that of bleaching membrane was $9.64 \text{ kg}/(\text{m}^2 \text{ h})$, while that of untreated original membrane was only $2.78\text{kg}/(\text{m}^2 \text{ h})$.

Keywords: Polytetrafluoroethylene membrane Hydrophilic modified Membrane distillation
Anti-pollution

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