Ain Shams University
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Preparation and Characterization of Composite Reverse Osmosis Membranes and Its Application for Saline Water Desalination

A Thesis submitted for PH.D.

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The present work

In the present study, thin film PVA/CA+PEG membranes are to be prepared and the PVA layer to be cross-linked by varying maleic acid concentration at different reaction periods. The polymer composite is to be employed for the reverse osmosis process of brackish, saline and sea water purification. The water flux and salt rejection selectivity of the RO membranes are to be monitored. The structural characterization of the polymer composite membranes, degree of crosslinking, crystallinity, surface roughness and hydrophobicity of the thin CA layers are to be emphasized using FT-IR, SEM, X-ray diffraction and the thermal stability viability through TGA performance.

Two factors must be balanced for a reverse osmosis membrane to work properly, namely, water permeability and salt rejection. Both water flux and salt rejection are also dependent on membrane properties, solution chemistry, and operating conditions. Finally, the antimicrobial activities of the synthesized membranes are to be assessed.

Thesis frame-work

The thesis is presented in a sequential structure in order to fulfill the requirements of the objectives and scope of the study. The thesis is presented in the following chapters:

Chapter 1: Introduction

Chapter 2: Experimental and methodology.

Chapter 3: Results and Discussion.

A -Synthesis, characterization and performance of reverse osmosis membranes.

B- Application of synthetic PVA+CA&PEG composite membranes in desalination of saline water.

Summary and Conclusions

References

Arabic Abstract

List of symbols and abbreviations

Abbreviation

Atomic force microscopy	(AFM)
Cellulose acetate	(CA)
Differential scanning microscope	(DSC)
Electric conductivity	(EC)
Escherichia coli	(E.coli)
Fourier transform infrared spectroscopy	(FTIR)
Membrane distillation (MD)	
(MF)Membrane filtration	
Nano filtration	(NF)
Polyacrylic acid	(PAA)
Polyethylene glycol	(PEG)
Polyvinyl alcohol	(PVA)
Reverse osmosis	(RO)
Staphylococcus-aureus(S-ureus)	
Scanning electron microscope	(SEM)
Total dissolved solid	(TDS)
Thin film composite	(TFC)
Thermal gravimetric analysis	(TGA)
Ultra-filtration	(UF)

Total dissolved solids	(TDS)

Total dissolved solids

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