شبكة المعلومات الجامعية

التوثيق الإلكتروني والميكروفيلم

بسم الله الرحمن الرحيم

HANAA ALY

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

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جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
علي هذه الأقراص المدمجة قد أعدت دون أية تغيرات

يجب أن

تحفظ هذه الأقراص المدمجة بعيدا عن الغبار

HANAA ALY

THE EFFECT OF OPERATING CONDITIONS ON THE PERFORMANCE OF A VACUUM MEMBRANE DISTILLATION UNIT USING PES FLAT SHEET MEMBRANE

By

Adel F. Gaid Abd El Said

A Thesis Submitted to the
Faculty of Engineering at Cairo University
In Partial Fulfillment for the
Requirements for the degree of
DOCTOR OF PHILOSOPHY
In
Civil Engineering – Public Works

FACULTY OF ENGINEERING, – CAIRO UNIVERSITY
GIZA, EGYPT
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Approved by the

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Title of Thesis:

The Effect of Operating Conditions on the Performance of a Vacuum Membrane

Distillation Unit Using PES Flat Sheet Membrane

Key Words:
VMD, hydrophobic membrane, permeate flux ,salt rejection, polyethersulfone membrane

Summary:
Vacuum Membrane Distillation (VMD) is a new separation technology based on the evaporation of saline water through hydrophobic porous membranes by applying vacuum pressure on the permeate side of the membrane to desalinate seawater. A lab scale experimental model was constructed and operated using hydrophobic polyethersulfone flat sheet membrane (PES), modified PES membrane, and PVDF membrane to study the effect of operating conditions on the performance of the VMD unit. Resultant permeate flux and salt rejection were measured for the following operating conditions: feed flow temperature (25-40-50-60-70°C), flow rate (1-1.2-1.3-1.4-1.5-1.6 L/min), salt concentration (5000, 10000, 15000 and 30000 ppm), and vacuum pressure (-0.2,-0.3,-0.4,-0.5 Bar). Results showed an increase in permeate flux due to increased temperature, flow rate and vacuum pressure, while it decreased with the increase in salt concentration. An increase in salt rejection was observed due to increased temperature, feed flow rate and vacuum pressure, while it decreased with the increase in salt concentration. An increase in salt rejection was observed due to increased membrane contact angle (membrane hydrophobicity). The system can be used at room temperature and low pressure (decrease energy cost), the system satisfy the allowable values for treated water for drinking water.

Disclaimer

I hereby declare that this thesis is my own original work and that no part of it has been submitted for a degree qualification at any other university or Institute.

I further declare that I have appropriately acknowledged all sources used and have cited them in the references section.

Name: Adel Fayez Gaid Abd El Said

Date: 2/3/2021

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