UNIVERSITI TEKNOLOGI MARA

REMOVAL OF MERCURY BY USING THIN FILM COMPOSITE MEMBRANE

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ABSTRACT

In this study, a thin film composite membrane was synthesized by coating a layer of polyvinyl alcohol, polyethylene glycol and chitosan hybrid solution crosslinked with tetraethylorthosilicate on a polysulfone support membrane. The aim of this experiment is to study the effect of varying the PVA concentrations on the characterization and performance of the TFC membrane. Two different concentrations were selected and used which are 5 wt% and 6 wt%. FTIR and TGA were used in order to find the membrane structure meanwhile for the performance testing; pure water permeability was used for water flux, antifouling properties and mercury removal. Results show that 5 wt% PVA concentrations have superior membrane characterization and performance. Moreover, the blend membranes showed improvements in the removal of heavy metal ions.

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CHAPTER 1

INTRODUCTION

1.1 Background study

Nowadays, composite membrane has been widely applied in a various applications in the industries with the significant improvement of technology. The ability to preserve the quality of level of water has grew harder with the growing number of water pollution (Habiba et al., 2017). Furthermore, the disposal of wastewater into the water sources such as domestic sewage and factory discharges affect the ecosystem, environment and human (Medhat Bojnourd & Pakizeh, 2018a). With the development of big cities and major industries to cater human needs over the few recent years, population growths have caused a lot of environmental problems ultimately contamination (Medhat Bojnourd & Pakizeh, 2018b). Heavy metals pollutants such as mercury that are found in the industrial waste waters can be detrimental to all living beings where toxic metal poisoning is predominantly happen to a significant environmental issue happening today (Abu-Saied et al., 2017). Therefore, an effective removal of heavy metals contaminants is essential to protect the environment and living creatures. The practice of more well-organized wastewater treatment system has been suggested by the World Health Organization in order to solve this matter in which current treatments consists of coagulation and flocculation, oxidation, biological treatment, adsorption and membrane separation (Medhat Bojnourd & Pakizeh, 2018a).

Membrane separation technology has much advantages over the conventional separation processes which include lower power utilization, smaller area required, ability to be manufactured with various sizes and modules, favourable mass transport, lesser pressure drop, materials sensitive to temperature can be used to certain extent, restoration capacity, high efficiency, simple scale-up and potential to be hybridized with other separation processes (Vatanpour, Salehi, Sahebjamee, & Ashrafi, 2018).

One of the most common polymers used in membrane is polysulfone (PSF) because of its stable thermally, mechanical strength, chemical inactiveness and exceptional endurance