

Coagulant bath medium effect towards polylactic acid membranes structure and methylene blue dye removal

Amira M. Nasib^{*1,3}, Stephen Simon¹, Syahmie M. Rasidi¹,
Siti Kartini E. Ab. Rahim^{1,3}, Hoo Peng Yong^{1,3}, Ng Qi Hwa^{1,3}
and Khairiraihanna Johari²

¹Faculty of Chemical Engineering & Technology, Universiti Malaysia Perlis, Malaysia, Kompleks Pusat Pengajian Jejawi 3, Kawasan Perindustrian Jejawi, 02600, Arau, Perlis Malaysia

²Department of Chemical Engineering, Universiti Teknologi PETRONAS, 32610 Seri Iskandar, Perak, Malaysia

³Frontier Materials Research, Centre of Excellence (FrontMate), Universiti Malaysia Perlis (UniMAP), Kampus Tetap Pauh Putra, 02600 Arau, Perlis, Malaysia

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Abstract. The asymmetric polylactic acid (PLA) membrane was prepared via phase inversion method using non-solvent induced separation (NIPS) technique. This study aims to synthesized as well as to characterize the PLA membrane and evaluating the membrane performance on water flux and permeability. In addition, this research also studied the removal performance of methylene blue dye. The polymer solution has been prepared using 12 wt.% of PLA and dissolved in 88 wt.% of Dimethylacetamide (DMAc) as a solvent. Then, the cast film was immersed in different ratio of coagulant bath medium (distilled water: methanol: ethanol) ranging from 100:0:0, 75:25:0, 75:0:25 and 75:12.5:12.5, respectively). Several characterizations were performed which include, membrane contact angle and membrane porosity. Performance PLA membranes were determined in terms of water flux and permeability at 1 bar transmembrane pressure using dead-end permeation cell. Finally, methylene blue (MB) removal efficiency was tested at the same transmembrane pressure. The findings revealed that the increase of alcohol concentration in coagulant bath resulted in higher porosity and lower contact angle. In short, MB dye rejection efficiency is also closely related to the amount of alcohol ratio used in coagulant baths. Increases in concentration of methanol and ethanol in coagulant bath medium increases the membrane porosity thus increased in efficiency of methylene blue rejection.

Keywords: coagulant bath medium; dye removal; non-induced phase separation; polylactic acid membrane

1. Introduction

Wastewater effluents are responsible for a wide range of water contamination problems. Water scarcity, a lack of safe drinking water, and the necessity to treat wastewater before discharging it into the environment have prompted scientists to look for a new low-cost technology that may either replace or improve present wastewater treatment technologies. Wastewater treatment's main purpose is to protect people and the environment by securely disposing of municipal wastewater

*Corresponding author, Ph.D., E-mail: amira@unimap.edu.my

(FRONMATE), Faculty of Chemical Engineering Technology and Research, Management Centre (RMC) of Universiti Malaysia Perlis.

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