

Enhanced permeation performance with incorporation of silver nitrate onto polymeric membrane

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ABSTRACT

Enhancing membrane permeation is usually an important parameter in the membrane development for filtration. In this study, polysulfone membrane equipped with different concentration of silver nitrate (0.5-2.0 wt%) were fabricated by phase inversion and later be known as composite membrane (CM) followed by letter (A till F) to indicate membrane composition. This study will investigate the effect of silver nitrate concentration to membrane permeation. Membrane morphology was investigated via scanning electron microscopy (SEM) and Fourier transform infrared spectroscopy (FTIR). Based on SEM examination, all composite membrane exhibits sponge-like structure otherwise FTIR for composite membrane with silver nitrate (CM B till CM E) shows additional peak at 1149.57 and 1294.24 indicating silver nitrate presence. In permeability test, composite membrane (CM C) with 1.0wt% silver nitrate achieved 22.25 L/m².h of flux, the highest among all the composite membrane configuration. Thus, the result implied the addition of silver nitrate can increase permeation performance though excessive content may reduce the performance up to 50% of flux reduction. This work provides a better understanding of silver nitrate implication toward membrane permeability therefore provide an insight to any application of silver nitrate in membrane composition.

Keywords: Silver nitrate; Polyethyleneimine; Polysulfone; Flux; permeability.

INTRODUCTION

Water plays a very important role in life and usage span from domestic usage, power generation, agricultural activities and even tourism industries. However, one of the world most contributing environmental problem was associated with water i.e. polluted water basin or contaminated ground water all of which required more focused water treatments to meet the demand of clean water/potable water [1]. There are various techniques used for polluted water treatment such as precipitation of chemical agent [2–5], adsorption on activation carbon [4–8], ion-exchange on resins as well as membrane processes [9–15]. Albeit water is the main elements made up the earth, and accessible by us, but due to various activities happen surround it has causes the water to pollute. Thus, a well management of water development should be implemented in order to conserve and maintain the water quality. It has been a nature for us to take an action only after a really critical crisis happen.