

## **COMPOSITE MEMBRANE WITH ANTI-BACTERICIDAL PROPERTIES FOR WASTEWATER TREATMENT**

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### **ABSTRACT**

The increases in wastewater production as a result from the growth of world population, urbanization and industrialization are known to pollute the environment. Many alternatives have been introduced to encounter the problem such as introduction of polymeric membrane technology for the wastewater treatment. However, the hydrophobic nature of the membrane materials causes serious organic fouling and biofouling. Therefore, this work was focused on the prevention of bacterial adhesion on the membrane surface in order to avoid the biofouling formation. The objective of this study was to investigate the potential of composite membranes in showing their anti-bacterial properties for wastewater treatment. The PVDF and PEI flat sheet composite membranes incorporated with nanoparticles Zeolitic Imidazolate Framework 8 (ZIF-8) and Zinc Oxide (ZnO) were fabricated by using wet phase inversion method. The performance of the fabricated membrane was characterized using SEM-EDX, contact angle analysis and TEM for synthesized ZIF-8. Filtration performances of the composite membranes were then tested in term of pure water flux, BSA and HA solute rejection and anti-bactericidal test. From the result obtained, ZIF-8/PEI membrane was found to be most resistant towards E.coli and St.aureus compared to other membranes. Additionally, the experimental findings has showed that ZIF-8/PEI has highest pure water permeation flux (0.0053 mL/cm<sup>2</sup>.min) with improved in hydrophilicity (56.622°) and excellent in BSA and HA solute rejection (92.9 % and 90.9% respectively). It was reported that ZIF-8/PEI membrane has ability to prevent or minimize the adhesion of bacteria on the membrane surface for wastewater treatment application.

**Keywords:** *nanoparticles, ultrafiltration, wastewater, zeolitic imidazolate framework 8 (ZIF-8), zinc oxide (ZnO)*