## *ABSTRACT*

*Chronic kidney disease reduces the kidneys' ability to eliminate metabolic waste products, such as creatinine and urea, thereby requiring therapies to assist blood purification, one of which is hemodialysis using a semipermeable membrane. Chitosan, a natural biopolymer, has potential as a hemodialysis membrane material; however, its mechanical properties and stability remain limited. Therefore, modification is required to improve the membrane characteristics and performance. This study aimed to synthesize and characterize vanillin-crosslinked chitosan membranes blended with poly(vinyl alcohol) (PVA) and to evaluate their performance in creatinine and urea dialysis. The membranes were prepared using the phase inversion method with vanillin-to-chitosan monomer ratios of 1:40 (CS/Va1/PVA), 1:30 (CS/Va2/PVA), and 1:20 (CS/Va3/PVA) at a chitosan weight ratio of 2:1. Membrane characterization included swelling, porosity, water uptake, hydrophilicity, tensile strength, flux measurements, and analyses using Fourier Transform Infrared Spectroscopy (FTIR), Scanning Electron Microscopy (SEM), and X-ray Diffraction (XRD). Membrane performance was evaluated through creatinine and urea dialysis using a two-compartment system separated by the membrane, followed by analysis using UV-Vis spectrophotometry. FTIR analysis confirmed the formation of Schiff base (C=N) bonds in the chitosan-vanillin membrane, while only hydrogen-bonding interactions were observed between chitosan and PVA. Membrane modification enhanced porosity, water uptake, hydrophilicity, and produced a more homogeneous and stable structure than the pristine chitosan membrane. The CS/Va3/PVA membrane exhibited the best performance, achieving creatinine and urea transport values of 34.22% and 39.88%, respectively, at the end of the dialysis test, representing improvements of 56% and 22%, respectively, compared with the pristine chitosan membrane.*



***Keywords:*** *Chitosan, Creatinine, Dialysis, Membrane, Poly(Vinyl Alcohol), Urea, Vanillin.*