

ABSTRACT

Chronic kidney failure is a disease caused by the kidneys losing their ability to filter metabolic waste product. Hemodialysis is a common treatment for removing toxic substances from the blood, such as urea and creatinine. Hollow fiber membranes are currently widely used in hemodialysis applications. The objective of this study is to synthesize polyeugenol and synthesize MIM (Molecularly Imprinted Membrane) and NIM (Non-Imprinted Membrane), determine the characteristics of the membrane, selectivity, permeability, and membrane transport result using a marketplace module. MIM (Molecularly Imprinted Membrane) was synthesized by combining polysulfone as the membrane base material with polyeugenol as the functional polymer contacted with urea and creatinine, PEGDE as a crosslinker, and the addition of varying concentrations of D2EHPA 0.1 M and 0.2 M as carrier compounds to increase membrane selectivity. The synthesis of NIM (Non-Imprinted Membrane) was carried out without contacting urea and creatinine. The synthesis results were printed into hollow fibers and characterized using FTIR, SEM-EDX, TGA, hydrophilicity test, porosity test, water absorption test, tensile test, flux test, and applied to the transport of a mixture of urea, creatinine, and vitamin B₁₂ using a marketplace module. The results showed that polyeugenol was successfully synthesized with a yield of 98.49%, a molecular weight of 13091,35 g/mol, and a degree of polymerization of 79,72. Hollow Fiber Hemodialysis Imprinted Membrane (HFHIM) D2EHPA 0.2 M has the best hydrophilicity, porosity, water absorption, tensile test, and flux test compared to other membranes. Transport data using the marketplace module showed that HFHIM has good performance and is highly selective in transporting urea and creatinine compared to Hollow Fiber Hemodialysis Non-Imprinted Membrane (HFHNIM) with the following selectivity order: urea > creatinine > vitamin B₁₂. The marketplace module showed better transport values compared to the small-sized module.

Keyword: Polyeugenol, D2EHPA, MIM, NIM, hollow fiber, hemodialysis, marketplace module