ABSTRACT

CS/PVP-MA membrane has been successfully synthesized and used as an adsorption membrane to reduce phosphate ion concentration in water. This membrane was produced through the phase inversion method. Physical-chemical and morphological properties of the membrane were characterized using FTIR, weight and thickness measurements, water uptake, swelling degree, porosity, pH resistance, biodegradability, hydrophilicity, tensile strength, and SEM. Phosphate ion concentration was analyzed using UV-Vis Spectrophotometry. FTIR results indicated the reaction between the C=O group of maleic acid and the -NH2 group of chitosan, forming a covalent amide bond. The CS/PVP-MA membrane showed lower weight and thickness compared to the CS/PVP membrane. The CS/PVP-MA4 membrane, with the highest maleic acid concentration, demonstrated the best physical-chemical properties, including thickness of 6.80 x 10^{-2} mm, weight of 0.117 g, water uptake of 75%, swelling of 106%, porosity of 94%, elongation of 5.61%, tensile strength of 31.89 MPa, pH resistance range of 5-11, 100% biodegradation in week 4, and hydrophilicity of 53.86%. The CS/PVP-MA membrane adsorbed phosphate ions at a maximum of 30-73% at pH 7 for 120 minutes at 60°C, following a pseudo-second-order kinetic model with an adsorption rate of 66.336 g $mmol^{-1}$ min^{-1}, and the adsorption isotherm followed the Freundlich model with a slope of 1.1206 and K of 0.2182 g mol^{-1}.

Keywords: membrane, chitosan, polyvinylpyrrolidone K90, maleic acid, adsorption, phosphate