

ABSTRACT

The textile industry produces dye waste that can pollute the environment, so wastewater treatment is necessary, one of which is through adsorption. Chitosan membranes are one of the natural materials that can be used as adsorbents in the dye adsorption process. However, pure chitosan membranes are not sufficiently effective due to their lack of active sites, mechanical strength, and low hydrophilicity. Modification of chitosan membranes is necessary to increase the active sites of the membrane while improving its mechanical strength and hydrophilicity, thereby enhancing its adsorption capacity. In this study, chitosan was modified with polyethylene glycol (PEG). The purpose of this study was to obtain polyethylene glycol modified chitosan membranes, characterize them, and then apply them for adsorption testing on methyl orange (MO) and methylene blue (MB) dyes. The synthesis of chitosan and modified chitosan membranes was successfully carried out, as indicated by a shift in the wavenumber region from 3358 cm⁻¹ to 3291 cm⁻¹. Surface morphology tests showed that the addition of PEG increased the porosity of the chitosan. The physical characterization of the modified membranes in swelling tests, water absorption, porosity, and hydrophilicity increased with increasing PEG addition, while weight and thickness decreased. The best membrane in the adsorption test was CsPEG2 with an adsorption capacity of 1.908 mg/g and adsorption percentage of 88.32% for MO dye and CsPEG1 with an adsorption capacity of 1.258 mg/g and adsorption percentage of 92.7% for MB dye.

Keywords : Methyl orange, methylene blue, adsorption, membrane, active sites, chitosan, polyethylene glycol.