

## ABSTRACT

*Water with high salinity levels is unsuitable for consumption as it can cause health problems, especially in coastal areas affected by seawater intrusion. One solution to this issue is membrane-based desalination technology. This study aims to develop CS/GEL membranes crosslinked with maleic acid (MA) combined with PEG-Triton X-100 additives, identify the effects of varying volumes of crosslinker and PEG-Triton X-100 on membrane characteristics, and evaluate the performance of the synthesized membranes in desalination. The study was conducted in three stages: 1) preparation of chitosan solution, gelatin dope solution, crosslinker solution, additive solution, and membrane formulation with volume variations; 2) characterization of functional groups by FTIR, morphology by SEM, and physicochemical tests; 3) membrane performance testing in RO desalination under 50 kgf/cm<sup>2</sup> pressure for 15 minutes followed by measurement of flux and salt rejection. FTIR results showed the presence of C=C (1647 cm<sup>-1</sup>), C–O–C (1027 cm<sup>-1</sup>), O–H (3357 cm<sup>-1</sup>), and C–H (2875 cm<sup>-1</sup>) groups, indicating successful membrane modification. SEM results demonstrated improved pore uniformity. Addition of PEG and Triton X-100 reduced contact angle (from 73.01° to 69.81°), increased water uptake (78%), swelling degree (35%), porosity (81%), and mechanical strength. NaCl 1% flux increased from 8.15 to 13.24 L·m<sup>-2</sup>·h<sup>-1</sup>, and salt rejection improved by 62.5%.*

**Keywords:** Membrane, Desalination, CS/GEL, PEG-Triton X-100.