

Performance and Fabrication of Interlayer-Free Inorganic Membrane for Wetland Saline Water Desalination

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The greatest issue of world's water scarcity has been encountered in Indonesia which is as the world's largest archipelago. This problem could be worst in the wetland areas which the rivers connected to the sea. Sea water intrusion causes salty water formed. This work was conducted to determine performance of organo silica membrane for wetland saline water desalination via pervaporation and the effect of membrane calcination temperature. Thin film silica membrane which is supported by alumina ($\alpha\text{-Al}_2\text{O}_3$) was prepared from precursor tetraethyl orthosilicate (TEOS) by hydrolysis and condensation reaction through sol-gel process followed by dip-coating in alumina support. Sol-gel process which is catalyzed by citric acid was found to increase proportion of silica mesopores within the matrices. The effect of citric acid catalysis in sol-gel process and calcination were investigated by membrane morphology and desalination performance. Silica membrane which was drained by wetland saline water (approximately 2.9-wt %) at room temperature showed increasing of water flux and salt rejection as a function of calcination temperature (200-250 °C). This is the first time of mesoporous membranes fabricated from a single organo catalyst (citric acid). As conclusion, this type of membrane is very robust and shows excellent salt rejection during desalination.

Keywords: Desalination via Pervaporation, Wetland saline water, Single organo silica membrane, Citric acid