



## The performance of a spiral wound RO membrane to desalinate a brackish groundwater in the middle of Iraq

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### ABSTRACT

In this study, a lab-scale of reverse osmosis (RO) system was used to investigate the performance of a spiral wound RO membrane to desalinate a brackish groundwater of several locations (Mandali, Al-Yusufiya, and Al-Musayyib) in the middle of Iraq. The investigation included different parameters such as permeate conductivity, permeate flux, and membrane salt rejection. In addition, the examinations of this work included studying the influence of feedwater temperature and feedwater pressure on permeate flux and membrane salt rejection. Moreover, foulant analysis by the scanning electron microscope images and the associated energy-dispersive X-ray spectroscopy spectra of the RO membrane after being used for 45 d in an existed pilot plant to treat the groundwater of Mandali location was also performed in this study. The results revealed that the difference in the groundwater quality of the selected locations had a significant effect on the permeate fluxes produced by the RO membrane system. In addition, increasing the feedwater temperature positively influenced the permeate flux and negatively impacted the salt rejection of the RO membrane. Furthermore, foulant analysis exhibited that the foulant accumulated on the RO membrane surface was most likely calcium carbonate (CaCO<sub>3</sub>) which was apparently in calcite form.

*Keywords:* Groundwater; Reverse osmosis; Feedwater; Permeate; Fouling; Salt rejection

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