

## Removal of salt from the Caspian Sea using a single- and double-layer membrane microbial desalination cell in continuous-mode operation

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### ABSTRACT

The Caspian Sea is the enormous source of saline water in northern Iran, which is a potential source for drinking water or for non-potable applications. Therefore, there is an urgent need to develop sustainable desalination methods. Microbial desalination cell (MDC) is an energy-efficient method for saline water desalination. In this study, the performance of single- and double-membrane MDCs were investigated in continuous operation mode flow. Experiments were carried out using water at different initial salt concentrations (5, 20, and 35 g/L). The single- and double-layer membrane MDCs produced a maximum electricity generation of 940 and 970 mV, respectively. However, maximum and minimum salt removing was 63.80% and 49.90% at 5 g/L of the single- and double-layer membrane, respectively. In addition, NaCl removal was increased by increasing hydrological retention time from 1 to 8 h. Moreover, the obtained result shows that recirculation of the catholyte on the anode and cathode increased the electricity generation at the end of the cycle. Totally, these results demonstrate the possibility of using this method as a safe and eco-friendly alternative for Caspian seawater desalination and power production by biodegradable organic matter and bacteria.

*Keywords:* Microbial desalination cell; Desalination; Bioelectricity; Bioenergy; Caspian Sea; Seawater desalination

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