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# Applicability of an Integrated Moving Sponge Biocarrier-Osmotic Membrane Bioreactor MD System for Saline Wastewater Treatment Using Highly Salt-Tolerant Microorganisms

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## ABSTRACT

Osmotic membrane bioreactors (OsMBRs) are a recent breakthrough technology designed to treat wastewater. Nevertheless, their application in high-salinity wastewater treatment is not widespread because of the effects of saline conditions on microbial community activity. In response, this study developed an integrated sponge biocarrier-OsMBR system using highly salt-tolerant microorganisms for treating saline wastewater. Results showed that the sponge biocarrier-OsMBR obtained an average water flux of 2 L/m<sup>2</sup> h during a 92-day operation when 1 M MgCl<sub>2</sub> was used as the draw solution. The efficiency in removing dissolved organic compounds from the proposed system was more than 99%, and nutrient rejection was close to 100%, indicating excellent performance in simultaneous nitrification and denitrification processes in the biofilm layer on the carriers. Moreover, salt-tolerant microorganisms in the sponge biocarrier-OsMBR system worked efficiently in salt concentrations of 2.4%. A polytetrafluoroethylene MD membrane (pores = 0.45 μm) served to regenerate the diluted draw solution in the closed-loop system and produce high-quality water. The moving sponge biocarrier-OsMBR/MD hybrid system demonstrated its potential to treat salinity wastewater treatment, with 100% nutrient removal and 99.9% conductivity rejection.

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