

Microbial desalination cells technology: a review of the factors affecting the process, performance and efficiency

Huang Jingyu, David Ewusi-Mensah*, Eyram Norgbey

Ministry of Education Key Laboratory of Integrated Regulation and Resource Development on Shallow Lakes, Hohai University, No. 1 Xikang Road, Nanjing, 210098, China/College of Environmental Engineering, Hohai University, Nanjing, China, email: huangjingyu120120@126.com (H. Jingyu), Tel. +86-183-05140585, email: ewusimensah.david@gmail.com (D.E. Mensah), eyramnorgbey@outlook.com (E. Norgbey)

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ABSTRACT

The concept microbial desalination cells (MDC) evolved from microbial fuel cells (MFC) technology. MDCs have been used in a wide range of applications since its introduction in 2009 including various configuration introduced by different researchers to solve some challenges in the operation of the reactor. Some of these applications include; seawater desalination, brackish water desalination, water softening, hydrogen and chemical production and groundwater remediation. Performance and efficiency of this technology is influenced by many factors just as any other technology, this review enlightens the varying impact of reactor configuration, pH imbalance/fluctuation, operational conditions, microbial conditions, substrate, materials and dimensions, electrode materials, resistance, hydraulic retention time (HRT) and conductivity on the performance of the MDC reactor in terms of electricity production, desalination and wastewater treatment (COD removal). The study also identifies and demonstrates the factors other studies have compared over the years till date classified under technical topics, theoretically showing their significance to enhance the improvement of MDC for future extension of its application. The study as well shows the relationship between the individual factors along with how these factors contribute to the performance and efficiency of the MDC reactor, its processing (operation) and the way forward.

Keywords: MDC performance; Microbial desalination cells; Sustainability; Water desalination

*Corresponding author.