

Electrodialysis desalination for water and wastewater: A review

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ABSTRACT

The principle of electrodialysis (ED) desalination was first presented in 1890 by Maigrot and Sabates, and its development into industrial scale started for more than 50 years ago. The operation of ED is driven by the development of ion exchange membranes produces high water recovery and does not require phase change, reaction, or chemicals. These advantages provide environmental benefits without the use of fossil fuels and chemical detergents. Whilst there are a number of reviews that have attempted to optimise ED performance for various applications, ED technology still has limitations involving scaling, membrane fouling, and permselectivity. In this paper, an extensive review of current studies on the process, principles, and setups of ED technology is given to deliver a comprehensive collection of all the main findings published on this technology so far. Also, it provides an overview of the possible sustainability approaches to be integrated with the ED process. The current developments and the sustainability of ED are critically examined for in-depth knowledge of what makes ED a promising desalination for potable water production. Finally, mathematical approaches to the design of ED process are briefly mentioned.

KEYWORDS

Electrodialysis desalination; Wastewater; Ion exchange membrane; Fouling; Electrodialysis reversal; Sustainability

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