Desalination and Water Treatment
www.deswater.com

doi: 10.1080/19443994.2015.1004592

57 (2016) 5391–5397
March

Taylor & Francis
Taylor & Francis Group

Comparing operational cost and performance evaluation of electrodialysis and reverse osmosis systems in nitrate removal from drinking water in Golshahr, Mashhad

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Received 1 February 2014; Accepted 31 December 2014

ABSTRACT

The aim of this study was to compare the operational cost and efficiency of electrodialysis and reverse osmosis systems in removing nitrate from drinking water. Eighteen samples were selected to measure nitrate and other chemical parameters. Also, the present cost value and useful life of 15 years were used for comparing both systems. Results indicated that nitrate removal in the reverse osmosis system was about twice (90%) more than that of the electrodialysis system. Additionally, removal of bicarbonate, sulfate, chloride, calcium, magnesium, sodium, and potassium in electrodialysis and reverse osmosis systems was 16, 5, 31, 29, 25, 7.9, and 10% and 93.7, 96.3, 96.8, 96.5, 96, 92.6, and 91%, respectively. Considering the economic issue of both systems, the initial capital cost, annual present cost value of operation and maintenance during the project period, and total present cost value in the electrodialysis system were 2.3, 1.9, and 3.0 times more than those of the reverse osmosis system, respectively. According to the obtained results, reverse osmosis was superior to electrodialysis in terms of cost per cubic meter of treated water and removal of nitrate and other chemical parameters.

Keywords: Reverse osmosis; Electrodialysis; Nitrate; Nitrite; Operational cost

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