Comparison of Electrocoagulation and Electrodialysis Water Treatment Technologies for Dry Zone Groundwater – Sri Lanka

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Abstract

Most of the drinking water sources in the dry zone are highly saline. Water desalination is achieved by reverse osmosis or nano filtration membrane methods. These methods are costly and the water is often over treated resulting in water with poor solutes content. Electrochemical methods such as electrocoagulation (EC) and electrodialysis reversal (EDR) methods are emerging as alternative solutions for water desalination. Both methods viz. EC and EDR can regulate water salinity, therefore they can tune treated water for desired Total Dissolved Solids (TDS). Compared to pressure driven methods, electrochemical methods, when properly optimised,are simple, free of chemicals and robust. Therefore, in this study, response surface methodology - statistical design of experiment was used to optimise reactor parameters of both treatment processes. When tube well water (470 mg/L TDS, 183 mg/L $CaCO_3$, 0.45 mg/L fluorides, and pH 6.60) was used for the EC treatment process, 63% hardness and 97% fluoride were removed with 1.98 kW h m^{-3} energy consumption. Compared to EC, the highest hardness removal efficiency (75%) was achieved with EDR treatment technology. Therefore, EDR water treatment technology is a viable method to treat dry zone groundwater in decentralised water treatment facilities.

Keywords: *Electrocoagulation, electrodialysis, groundwater, hardness, technology*

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