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Comparative Electrochemical methods for treatment in dry zone drinking water, Sri Lanaka

J.U. Halpegama[1*],U.S. Liyanaarachchi[2], Ajith C Herath[3],H.P.T.S. Wickramanayake[4], B.A,Y.B. Jayawardhana[1] Tian Bibhui[5] and R. Weerasooriya[1]

[1]*National Institute of Fundamental Studies, Hanthana Road, Kandy, Sri Lanka*
[2]*Department of Nano Science, Faculty of Technology, Wayaba University of Sri Lanka*
[3]*Department of Physical Sciences, Faculty of Applied Sciences, Rajarata University of Sri Lanka*
[4]*Department of Applied Sciences, Faculty of Science, University of Peradeniya*
5*Research Center for ECO-Environmental Sciences, Chinese Academy of Sciences*

jhalpegama@gmail.com

Electrocoagulation (EC) is a promising green technology for the treatment of drinking water which contain excess fluoride and hardness. Zero requirement of chemicals, easy operation and reduced sludge production are the characteristic advantages of this treatment process. EC is based on the dissolution of the electrode material which further acts as coagulant agents in the aqueous solution. Passivation of Al electrode, scaling on the cathode and the existence of free Al ions which are toxic to humans as some drawbacks associate with EC. On the other side, Electrodialysis (ED) is an electrically driven membrane technology which can be used to produce potable water from brackish. Unlike other membrane pressure technologies, direct current voltage is the major requirement for transfer of ions through the semipermeable ion exchange membranes, which is made up of alternative cation and anion exchange membranes. During the process, feed water can be separated in to three main types of water namely, dilute or product water with low conductivity and TDS, concentrated water with numerous excess ions present in feed and the electric feed water which create the electric potential that passes directly over the electrodes. EDR offers the benefit of removal of ions which have 0.001 μm in size with an approximate molecular weight 100-200. Due to the lack of barrier effect, microbiological contamination already presents in the treated water which gives a bad remark to this technology. Since, ions are transferred through the semipermeable ion exchange membrane by means of direct electric current, dissociation of salts in water, membrane properties, Faraday's law and the Ohm's law are the four primary operating principles that control the ED. The aim of this work is to compare these two electrochemical methods to identify the most efficient and suitable treatment process to treat water, especially in the dry zone where ground water contains high salinity. Before apply this technology directly to the village, lab work is essential to optimize both current and voltage by improving the final water quality.

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