PRODUCTION OF ULTRAPURE WATER BY ELECTRODEIONIZATION (EDI)-EFFECT OF ION EXCHANGE RESIN BED CONFIGURATION

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Electrodeionization (EDI) is a process that removes ionizable species from water using electrically active media and an electrical potential to facilitate the ion transport. The electrically active media in EDI devices may function to alternately collect and discharge ionizable species, or to facilitate the transport of ions continuously by ionic or electronic substitution mechanisms [1, 2].

The aim of this study is to produce ultrapure water from a reverse osmosis permeate by EDI method and to check the quality of product water as a function of process parameters such as applied voltage and configuration of ion exchange resin bed filled between ion exchange membranes. The experimental set-up consisted of a three-compartments cell, three separate liquid lines, a power supply, three magnetic pumps, flow meters, and solution reservoirs. The cathode and anode compartments of the cell are separated from the central compartment with the ion exchange membranes (Selemion AME anion exchange membrane and Selemion CME cation exchange membrane). The central compartment filled with the ion exchange resins (Purolite CT 175 cation exchange resin and Purolite A500 anion exchange resin). Figure 1 shows the plots of the electrical conductivity values of product water vs. time as a function of applied voltage for both mixed bed (MB) and layered bed (LB) configurations. According to the obtained data, it was possible to get a product water with much lower conductivity using MB configuration than that of LB configuration. When a 25 V of potential was applied to EDI cell with MB configuration, the conductivity of product water decreased from 15 μS/cm to 0.6 μS/cm within 3 h. However, the respective value for LB configuration after 3 h was 7.86 μS/cm at 20 V of applied potential.

![Figure 1. Electrical conductivity versus time plots for mixed bed (MB) and layered bed (LB) configurations as a function of applied potential](image)

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References