# Application of Electrodeionization to Chemical Product Purification

Yupo J. Lin
Argonne National Laboratory
Argonne, Illinois 60439

Electrodialysis (ED) is commonly used for salt removal. However, when the solution conductivity of a process stream is lower than a critical level, the desalting ED process becomes economically unfavorable. This is because, at high solution resistance, the ED process can only be operated in very low limiting current that results in a low salt removal rate. Using the electrodeionization (EDI) process, the low solution conductivity is enhanced by the insertion of ion-exchange resin beads between the ion-exchange membranes and, thus, the removal rate can be increased.

A systematic evaluation of the application of a continuous EDI process on product purification (e.g., desalting of sugar solution) was carried out. Critical process performance indexes for applying EDI in product purification were examined. These indexes include the total salt removal rate, the salt removal efficiency and the power consumption of the desalting process. The influence of the operation parameters, including the current utilization and residence time of the solution in the resin cell, on these indexes were evaluated. The residence time was found to have the most pronounced effect on the salt removal efficiency.

Mixed cation and anion resins were evaluated using a screening procedure where the conductivities of each type of resin were measured using different resin salt forms and different salt solution concentrations. The results of the screening gave qualitative as well as quantitative information on which ion exchange resins are suitable for use in the EDI process. Some suggestions for applying the EDI process in chemical product purification will also be discussed.