Desalination and Water Treatment
www.deswater.com

34 (2011) 25–31
October

1944-3994/1944-3986
doi: 10/5004/dwt.2011.2807

Time dependence of transport number ratio during electrodialysis process

Ryosuke Takagi[a,*], Sri Mulyati[a,b], Nasrul Arahman[b], Yoshikage Ohmukai[a], Tatsuo Maruyama[a], Hideto Matsuyama[a,**]

[a]*Center for Membrane and Film Technology, Department of Chemical Science and Engineering, Kobe University, Kobe, Japan*
*Tel./Fax: +81-78-803-6279; email *: takagi@harbor.kobe-u.ac.jp, **: matuyama@kobe-u.ac.jp*
[b]*Department of Chemical Engineering, Syiah Kuala University, Banda Aceh, Indonesia*

Received 3 September 2010; Accepted 3 January 2011

ABSTRACT

The transport number ratio between anion and chloride ion P^a_{Cl} was measured to discuss the anion permselectivity in an electrodialysis (ED). It was shown that P^a_{Cl} changed with the progress of ED. In this paper, a mechanism of anion permselectivity in ED was theoretically discussed with an equivalent circuit to find the reason why P^a_{Cl} changed with the progress of ED. It was found that P^a_{Cl} depended on the total electrolyte concentration of the diluted compartment C_B. Then, P^a_{Cl} changes with the progress of ED, since C_B decreases with the progress of ED. In addition, the simulation of ED with the equivalent circuit was successfully performed using the electric resistances of the equivalent circuit obtained from the analysis of P^a_{Cl}.

Keywords: Electrodialysis; Permselectivity; Transport number; Equivalent circuit; Simulation; Desalination

*Corresponding author.

Presented at the AMS6/IMSTEC10, The 6th conference of the Aseanian Membrane Society in conjunction with the 7th International Membrane Science and Technology Conference, Sydney Australia, November 22–26, 2010