Desalination and Water Treatment
www.deswater.com
20 (2010) 253–263
August
1944-3994 / 1944-3986
doi: 10.5004/dwt.2010.1579

Study and modeling of the separation characteristics of a novel alkali-stable NF membrane

Liming Zhao[a], Wenshui Xia[a]*, Hefei Zhao[b], Jun Zhao[b]

[a]*State Key Laboratory of Food Science and Technology, School of Food Science and Technology, Jiangnan University; 1800, Lihu Avenue, Wuxi City, Jiangsu Province 214122, China*
Tel. +86 (510) 85919121; Fax +86 (510) 85329057; email: xiaws@jiangnan.edu.cn
[b]*Hydrochem Engineering (Shanghai) Co., Ltd., 99 JuLi Road, Zhangjiang Hi-Tech Park, Pudong Area, Shanghai 201203, China*

Received 15 October 2009; Accepted in revised form 29 January 2010

ABSTRACTS

In this study, we used several methods to examine the membrane structure of a kind of alkali-stable nanofiltration membrane, as well as the effect of pH on its permeability, retention, and structure. A novel alkali-stable nanofiltration membrane was studied. Its retention and flux behavior could be related to its charge, its swelling properties and its pore size distribution. The filtration performed was of uncharged glucose, salt solutions, and caustic sodium solution. A novel artificial neural network-based model was generated to simulate the permeate flux and retention behaviors. Our experimental data were compared with the model outputs. A Spiegler–Kedem model was also examined in this study. Our results showed that the membrane pore diameter was about 0.36 nm, and had a negative surface charge. In addition, the membrane opened significantly at high pH, a finding which can be attributed to the chemical nature of the polymer chains in the membrane skin layer. The correlation factor of the artificial neural network model was 0.9918, which was a little higher than that of Spiegler–Kedem model, indicating that both models are suitable to predict this membrane system.

Keywords: Nanofiltration; Structure parameter; Artificial neural networks; Surface charge; Retention; pH dependency

* Corresponding author.