

일반강연 I-2

## 폴리비닐알콜 나노 복합막의 화학적 안정성

박덕순, 오남운, 제갈종건, 이규호

분리소재연구센터, 한국화학연구소, 대전광역시 유성구 장동 100

### Stability of the NF Composite Membranes Based on Poly(vinyl alcohol)

Duk-soon Park, Nam-wun Oh, Jonggeon Jegal, and Kew-Ho Lee  
Membrane and Separation Research Center, Korea Research Institute of  
Chemical Technology, 100, Jang-dong, Yuseong-gu, Taejeon, 305-606

#### 1. Introduction

In the previous study, we had prepared PVA NF composite membranes having thin active layers, which had shown fairly good flux and rejection. Typical permeation properties of those membranes were as follows; at 200 psi, the flux was about  $1.3\text{m}^3/\text{m}^2\cdot\text{day}$  and rejection was about 96% with PEG 600 solution. From the permeation test with various inorganic salts such as  $\text{Na}_2\text{SO}_4$ ,  $\text{MgCl}_2$ , and  $\text{NaCl}$ , it was found that the surface of those membranes was anionic.

However, we have not proved the chemical stability of those membranes, so in this work, we have prepared PVA membranes with good performances and tested to prove their chemical stability. The chemical stability of them were compared with that of polyamide membranes(PA), confirming that PVA membranes have much higher chemical stability than PA membranes.

#### 2. Experimental

PVA composite membranes were prepared by coating PVA solution on the microporous polysulfone support (UOP UF membrane). The coating layers were crosslinked using glutaraldehyde as crosslinking agent. And then the membranes were treated with different solutions such as  $\text{NaOH}$ (pH 14),  $\text{K}_2\text{CO}_3$ (pH 14), and  $\text{HCl}$ (pH 1) for 17 hours. The

morphologies of the membranes were characterized with SEM. The membranes were tested with different feed solutions (1000 ppm solutions of PEG 600, Na<sub>2</sub>SO<sub>4</sub>, MgCl<sub>2</sub>, and NaCl) at various operating pressures (100~400 psi.) to observe their permselective performances. All tests were conducted at room temperature.

### 3. Results and Discussion

**Permeation Test** : PVA composite membranes were tested with different feed solutions. In the case of PEG 600 solution, the flux at 200 psi was about 2.0 m<sup>3</sup>/m<sup>2</sup>.day and rejection was about 87%.

**Chemical Stability** : Compared to polyamide composite membranes, PVA composite membranes had better chemical stability. The results of the test were as shown in Figure 1.

### 4. References

1. T. Hirotsu, K. Ichimura, K. Mizoguchi, and E. Nakamura, *J. Appl. Polym. Sci.*, **36**, 1717 (1988)
2. R. Rautenbach, C. Herion, M. Franke, A. Fattah, A. Asfour, A. Benquerez-Costa, and E. Bo, *J. Memb. Sci.*, **36**, 445 (1988)
3. J. G. Jegal, and K. H. Lee, *J. Appl. Polym. Sci.*, **61**, 389 (1996)
4. J. G. Jegal, and K. H. Lee, *J. Appl. Polym. Sci.*, in press (1999)

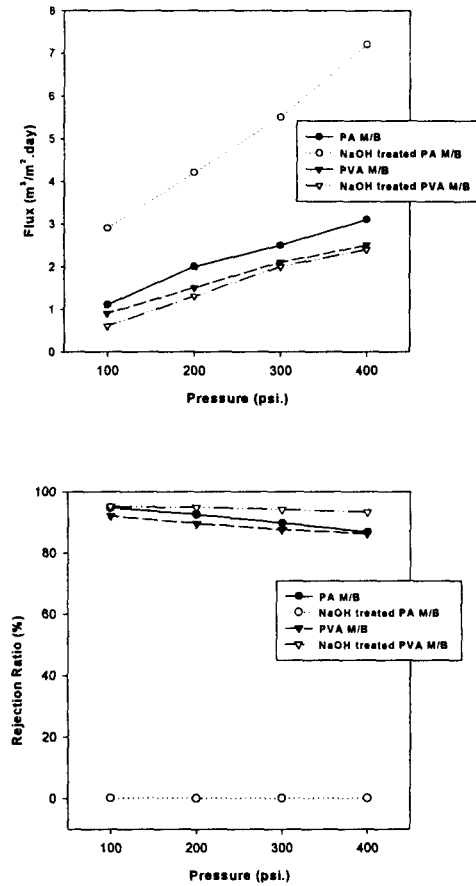


Fig. 1. The effect of the chemical treatment with NaOH solution(pH 14) on the performance of PVA composite membranes (Feed solution; PEG 600 1000 ppm)