

### Simultaneous removal of nitrate and phosphate using cross-flow micellar-enhanced ultrafiltration

이율리아, 백기태, 김호정, 김보경, 양지원\*  
한국과학기술원  
(jwyang@kaist.ac.kr\*)

The simultaneous removal of nitrate and phosphate from wastewater using micellar-enhanced ultrafiltration (MEUF) was investigated. A cationic surfactant, cetylpyridinium chloride (CPC) forms micelles at above the critical micelle concentration, which have positive charge on their surface. Nitrate and phosphate bind on the surface of micelles electrostatically and are rejected by ultrafiltration membrane. In this study, cross-flow MEUF system was designed to investigate the feasibility of MEUF system for the field application. The synthetic wastewater was treated by a polyacrylonitrile membrane with molecular weight cut-off of 30,000. With the molar ratio of CPC to total pollutants of  $> 3$ ,  $> 90\%$  of nitrate and  $> 99\%$  of phosphate were removed and  $> 99\%$  of CPC was also rejected. The main factor of flux decline in MEUF is fouling due to the concentration polarization of surfactant on the membrane. In the present study, the flux was maintained 60–70 L/m<sup>2</sup>hr, which was 20% of the flux of distilled water, while CPC was concentrated from 1 mM to 80 mM. Therefore, it is feasible to remove nitrate and phosphate simultaneously using the cross-flow MEUF system.