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Comparison of rejection of trace antibiotics using nanofiltration and forward osmosis

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Two membrane technologies, nanofiltration (NF) and forward osmosis (FO), were applied to test their capabilities of rejecting trace antibiotics in water. As a emergingprocess driven by a difference in osmotic pressure across the membrane, FO was supposed to have a different rejection behavior compared with that of NF which needs hydraulic pressure as the drive. Four antibiotics, namely, sulfamethoxazole,trimethoprim, norfloxacin and roxithromycinwhich belong to four different antibiotic groups with different properties such as molecular weight (253-837), charge and hydrophobicity, were selected as the target trace organics. Each of the antibiotics was spiked in water at the concentration of 200 μg L^{-1}. Results demonstrated thatNFachieved a rejection range of 95-99% for the four antibiotics, of which the main rejection mechanism was considered to besteric exclusion. In term of FO, rejection strongly depends upon the membrane orientations. In the active layer of membrane facing feed solutions mode(AL-FS), rejections of the four antibiotics were in the range of 87-96%, while they are 57-89% in the active layer of membrane facing drawsolutions mode (AL-DS). Diffusion of the antibiotics through theFO membrane was believed tobe adominated behavior affecting the antibiotic rejections. In addition, the low rejections in AL-DS mode was ascribedto the severe internal concentration polarization (ICP). In general, the overall antibiotic rejections in the NF process were higher than those during the FO process. The diverse rejection behaviors between the two processes were attributed to the different membrane properties and rejection mechanism.

Biography

Pengxiao Liuis a PhD candidate at the age of 28 years from Dalian University of Technology.His main research field concerns novel membrane separation technologies and chemical engineering processes. He has published 2 papers in reputed journals like Chemical Engineering Journal. He is very passionate in the scientific research, and wish to make more contributions in this area in the future.

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