

分离工程

## 用纳滤膜分离混合无机电解质溶液的性能评价方法

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**摘要** 提出一个新的混合无机电解质溶液的纳滤膜分离性能的评价方法。该评价方法将纳滤膜分离性能表述为某种离子在膜中的透过率,其值与混合电解质总浓度、各种离子的当量分数和同号离子之间通过纳滤膜的竞争作用有关。首先根据双组分无机电解质溶液的纳滤膜分离实验获得离子的竞争系数,然后采用几种不同组成不同浓度的混合电解质溶液(NaCl和NaF; NaCl和KCl; NaF、NaCl和NaNO<sub>3</sub>; NaCl、NaNO<sub>3</sub>和Na<sub>2</sub>SO<sub>4</sub>; NaF、NaCl、NaNO<sub>3</sub>和Na<sub>2</sub>SO<sub>4</sub>)通过ESNA 1膜的透过实验验证该评价方法的适用性。结果表明混合电解质溶液总浓度和离子的当量分数是影响各种离子通过纳滤膜的表现透过率的主要因素,评价方法预测值与实验数据相符合。说明该方法适用于评价含有单价阳离子的混合无机电解质溶液的纳滤膜分离性能。

**关键词** [膜分离](#); [纳滤](#); [混合电解质](#); [评价方法](#); [透过率](#)

分类号

## A novel evaluation of separation performance of nanofiltration membranes for mixed electrolytes solution

### Abstract

A novel evaluation of the separation performance of nanofiltration (NF) membranes for the mixed electrolytes solution was proposed. In the evaluation, the observed transmission of an ion through a NF membrane was used to express the separation performance of the membrane for the ion in the mixed electrolytes solution, which had a relationship with the total concentration of mixed electrolytes, the equivalent fraction and the species of each ion. Firstly, according to the permeation experiments of NF membrane for some binary electrolytes solutions, the competition coefficients of four anions (F<sup>-</sup>, Cl<sup>-</sup>, NO<sub>3</sub><sup>-</sup> and SO<sub>4</sub><sup>2-</sup>) were obtained. Then verification of the model was carried out in the permeation of some mixed electrolytes solutions [(1)Na<sup>+</sup>, Cl<sup>-</sup> and F<sup>-</sup>; (2)Na<sup>+</sup>, K<sup>+</sup> and Cl<sup>-</sup>; (3)Na<sup>+</sup> and NO<sub>3</sub><sup>-</sup>; (4)Na<sup>+</sup>, Cl<sup>-</sup>, NO<sub>3</sub><sup>-</sup> and SO<sub>4</sub><sup>2-</sup>; (5)Na<sup>+</sup>, F<sup>-</sup>, Cl<sup>-</sup>, NO<sub>3</sub><sup>-</sup> and SO<sub>4</sub><sup>2-</sup>] through one kind of commercial NF membrane (ESNA 1). The investigation results showed that both the total concentration and the equivalent fractions of ions were important parameters affecting the separation performance of NF membrane for the mixed electrolytes solution. The agreement between the model evaluation results and the experimental data indicated that the model is suitable for evaluating the separation performance of three NF membranes for the mixed electrolytes solution with univalent cations.

**Key words** [membrane separation](#) [nanofiltration](#) [mixed electrolytes](#) [model evaluation](#) [transmission](#)

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