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The effect of the concentration polarization and the membrane layer mass transport on membrane separation

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ABSTRACT

The negative effect of the concentration polarization layer on the membrane separation is well known. How the mass transport parameters of the membrane matrix, e.g. the solubility coefficient, membrane diffusion coefficient, membrane thickness, can affect the concentration profile of the boundary layer, and consequently, the separation efficiency is not investigated in detail yet. This article gives the suitable mathematical expressions, in order to predict the well known parameters as polarization modulus, enrichment factors, etc., taking into account the transport parameters for both the concentration boundary and the membrane layers, and analysis the concentration distribution and the polarization modulus. It has been shown that the transport properties of the membrane layer have significant effect on the concentration profiles of the boundary layer and thus, on the polarization modulus, enrichment factors, etc., as well. Thus, the well known equations, e.g. the polarization modulus, enrichment factor [see e.g. Eqs. (2) and (3)], could be regarded as approaches.

Keywords: Concentration polarization; Solubility; Pervaporation; Enrichment

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