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Nanofiltration of uncharged solutes: simultaneous effect of the polarization and membrane layers on separation

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ABSTRACT

The effect of the concentration boundary layer on the pressure-driven membrane separation like nanofiltration or ultrafiltration is well-known and extensively discussed in the literature. In most of these studies, the effect of the boundary layer and that of the membrane layer on the separation efficiency are discussed separately. This paper presents a general model to describe the convective and diffusive mass transport taking into account the simultaneous effect of both the concentration boundary layer and the membrane layer. The advantage of this model that the mass transport can be correctly described under all mass transfer conditions, independently that the effect of the boundary layer can or not be neglected.

Keywords: Nanofiltration; Simultaneous effect of polarization and membrane layer; Hindered diffusion; Mass transefer; Diffusion plus convection; Concentration polarization; Polarization modulus; Rejection coefficient

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