Simultaneous adsorption and diffusion in membrane separation of liquid stream

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Transport through the membrane matrix is primarily a balance between convection and diffusion, depending on the pore size and permeability of the membrane. However, there can be instances of adsorption together with concentration polarization particularly in the case of adsorbent present in the membrane matrix. The first such modeling attempted was developed by Doshi (1986) [Doshi MR. Limiting flux in the ultrafiltration of macromolecular solutions. In: Sourirajan S, Matsuura T, editors. Reverse Osmosis and Ultrafiltration, Vol. 281. Washington, DC: ACS Symposium series,1985:209–223] combining the interplay of adsorption and concentration polarization. However, the mathematical analysis was restricted to the limiting regimes of adsorption or diffusion dominated. The proposed talk will describe a transport phenomena based model of coupling adsorption with diffusion, which can be useful for understanding the filtration process in mixed membranes. At the end of the talk, the challenges yet to be explored will also be presented.