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Concentration boundary layers in osmotic membrane transport processes[1] KAARE JENSEN, TOMAS BOHR, HENRIK BRUUS, Center for Fluid Dynamics, Technical University of Denmark — It has long been recognized, that the osmotic transport characteristics of membranes may be strongly influenced by the presence of unstirred concentration boundary layers adjacent to the membrane [1,2]. Previous experimental as well as theoretical works have focused on the case where the solution on both sides of the membrane remain well-mixed due to an external stirring mechanism. We present a theoretical investigation the effects of concentration boundary layers on the efficiency of osmotic pumping processes in the absence of external stirring i.e. when the stirring is provided by the osmotically generated flow itself. For such systems, we show that no well defined boundary layer thickness exist and that the reduction in concentration can be estimated by a surprisingly simple mathematical relation valid across a wide range of geometries and Péclet numbers.

[1] T.J.Pedley, Q. Rev. Biophys., 1983, **16**, 115
[2] K.H.Jensen et al., Lab Chip, 2009, **9**, 2093

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