



Permeate Pressure Build-Up in Hollow Fiber Membranes: Facts and Perceptions

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The effects of permeate pressure build-up on separation performance of hollow fiber membranes will be analyzed, with an objective of rectifying some perceptions about pressure build-up in hollow fiber membranes. It is generally perceived that a higher pressure build-up will occur at a higher feed pressure, and as such the apparent membrane permeance decreases with an increase in the feed pressure. In this study, the apparent and intrinsic permeances of gases in asymmetric hollow fiber membranes were evaluated based on experimental data and numerical analysis. It was revealed that although the permeate pressure build-up increases as the feed pressure increases, the effect of the permeate pressure build-up on the membrane performance is actually reduced at higher feed pressures. In fact, contrary to what is normally perceived, the membrane performs close to its intrinsic permeability if it is operated at a high feed pressure, under which conditions the effect of pressure build-up on the membrane performance is minimized. The percentage loss in transmembrane driving force is actually less at a higher feed pressure than that at a lower feed pressure.