Publication Abstracts - Pervaporation

J.G. Wijmans and R.W. Baker, "A Simple Predictive Treatment of the Permeation Process in Pervaporation, " *Journal of Membrane Science* 79, 101 (1993).

In pervaporation, a liquid feed contact one side of a membrane and a vacuum is drawn on the other side of the membrane, producing a permeate vapor. Conventional transport models describe pervaporation in terms of solution equilibrium between the liquid feed and the membrane material, diffusion through the membrane driven by a chemical potential gradient, and desorption into a vapor phase on the permeate side of the membrane. This is called the solution-diffusion model. The treatment presented in this paper is based on the same model but the driving force for permeation is expressed as a vapor pressure difference rather than a concentration difference. The resulting pervaporation transport equation contains the feed-side and permeate-side partial vapor pressures and the membrane normalized permeation flux, as commonly defined in gas and vapor separation. An advantage of our approach is that the role of the operating conditions of pervaporation (feed temperature and permeate pressure) becomes clear. Membrane performance can be separated from the operating conditions, so that comparison of pervaporation separation data from various sources can be made, even if the operating conditions are not identical. Another advantage is that the contributions of the vapor-liquid equilibrium and the membrane selectivity to the overall pervaporation separation factor are recognized. Experimental data taken from our won work and from the literature are analyzed using the proposed model. The analysis confirms the usefulness of our approach.