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Modelling of Mixed Matrix Membranes: Validation of the Resistance-Based Model

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Abstract

In this study, the extended Resistance-Based (RB) model introduced in the preceding paper, was validated for the prediction of the steady state mass transport of species through various mixed matrix membranes (MMMs) used in pervaporation and gas separation applications. This validation was performed by using experimental data for the pervaporation separation of butanol from binary aqueous solutions using Polydimethylsiloxane (PDMS)/activated carbon (AC) mixed matrix membranes and the permeability data of various gases through Polyvinylidenefluoride (PVDF)/Zeolite A4 and PVDF/MCM-41 mixed matrix membranes obtained from the literature. These experimental data were compared with the predicted values obtained from the extended RB model as well as the estimations obtained by numerous analytical models for ideal MMMs under the identical conditions. Results show that the extended RB model is a very good predictive model to estimate the effective permeability of ideal MMMs used for pervaporation and gas separation.

Abbreviations

AC, Activated Carbon; *BOT,* Böttcher Model; *BRG,* Bruggeman Model; *HIG,* Higuchi Model; *HNP,* Hennepe Model; *LN,* Lewis-Nielsen Model; *MMM,* Mixed Matrix Membrane; *MXW,* Maxwell Model; *PAL,* Pal Model; *PDMS,* Polydimethylsiloxane; *PVDF,* Polyvinylidenefluoride

Keywords: Mixed Matrix Membranes; Effective permeability; Pervaporation; Gas Separation; Extended RB Model

Nomenclature

$\bar{A}$	Parameter of Antoine Equation
b	Parameter of Correction Factor Equation (-)