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Discrimination among gas translation, surface and Knudsen diffusion in permeation through zeolite membranes

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ABSTRACT

Gas translation diffusion is proposed to compete with surface diffusion for describing the permeation of light gases (He, H₂, CO₂ and CO) through zeolite membranes. The analysis for both DD3R and NaY zeolite membranes shows some differences in H₂, CO and CO₂ permeation for both binary/ternary gas mixture and single gas.

The permeation description through gas translation of weakly adsorbed species such as, e.g., H₂, specifically at low temperatures, is more accurate than that obtained by Knudsen diffusion in a previous work. Gas translation paired to surface diffusion well reproduces the maximum in H₂ flux, which was missed by the Knudsen diffusion [Caravella et al., Micropor.

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