Study of diffusional and structural parameters of five single gases in MTES and zeolite membranes using unsteady-state permeation

문종호, 배윤상, 정종태, 정진환, 권준미, 조철희[1],
현상훈[2], 이창하*
연세대학교 화학공학과; [1]한국에너지기술연구원;
[2]연세대학교 세라믹공학과
(leech@yonsei.ac.kr*)

The equilibirum and kinetic characteristics of a MTES templating silica/α-alumina composite membrane and zeolite membranes were studied by using unsteady and steady-state permeation of pure CO_2, N_2, CH_4, H_2 and He gases. The saturated amount of adsorption, Langmuir parameter and Maxwell-Stefan diffusivity could be estimated by the generalized Maxwell-Stefan model incorporating dust gas model and Langmuir model from transient transport and steady-state measurements. Using the obtained equilibrium and kinetic parameters, the perameation fluxes at unsteady-state pressurization and depressurization steps in the membrane could be predicted. Since the permeation flux in the MTES membrane was affected by molecular sieving effect as well as surface diffusion property, the kinetic and equilibrium separation should be considered simultaneously in the membrane according to molecular properties.