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Gas Permeation Behavior of Single and Mixed Gas Components Using an Asymmetric Ceramic Membrane

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Abstract : A unique sol–gel dip-coating process to form an asymmetric silica membrane with improved membrane performance and reproducibility has been reported. First, we deposited repeatedly a silica solution on top of a commercial alumina membrane support to improve its structural make up. The coated membrane is further processed under clean room conditions to avoid dust impurity and subsequent drying in an oven for high thermal, chemical and physical stability. The resulting asymmetric membrane exhibits a gradual change in the membrane layer thickness. Compared to a single-layer process using only the membrane support, the dual-layer process improves both flux and selectivity. For the scientifically significant difficulties of natural gas purification, collective CO2, CH4 and H2 gas fluxes and separation factors obtained gave reasonably excellent values. In addition, the membrane selectively separated hydrogen as demonstrated by a high concentration of hydrogen recovery.

Keywords : gas permeation, silica membrane, separation factor, membrane layer thickness
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