Enhanced gas separation performance of 1,3,5-benzenetricarboxylic acid/polymer composite membranes through the synergistic effect

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1,3,5-benzenetricarboxylic acid (H_3BTC) was utilized in polymer composite membranes to achieve enhanced CO_2/N_2 separation performance. The CO_2 separation performance was expected to be enhanced by the synergistic effect of (1) the increased solubility of CO_2 by dipole–dipole interactions between CO_2 and carboxyl groups in H_3BTC and (2) the barrier effect of H_3BTC on the transport of N_2. Consequentially, the PVP/H_3BTC membrane showed the selectivity of CO_2/N_2 increased to 8.5 with a CO_2 gas permeance of 1.2 GPU, while the neat PVP membrane did not show separation performance. The physicochemical behaviors of H_3BTC in PVP were investigated by FT-IR and TGA analyses.