

CO₂ Permeability, Diffusivity, and Solubility in Polyethylene Glycol-Grafted Polyionic Membranes and CO₂ Selectivity Relative to Methane and Nitrogen

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Polyethylene glycol (PEG) is grafted onto ionic polymers poly[p-vinylbenzyltrimethylammonium tetrafluoroborate] (P[VBtMA][BF₄]) and poly[2-(methacryloyloxy)ethyl-trimethylammoniumtetrafluoroborate] (P[MATMA][BF₄]). Membranes made of P[VBtMA][BF₄]-g-PEG and P[MATMA][BF₄]-g-PEG are found to be CO₂ selective for CO₂/CH₄ and CO₂/N₂ separations. At the same permeability, the P[MATMA][BF₄]-g-PEG membranes are demonstrated to have a higher CO₂ selectivity than the previous polymeric membranes. The selectivity of both P[VBtMA][BF₄]-g-PEG and P[MATMA][BF₄]-g-PEG is primarily due to solubility differences, not diffusivity differences.