

CO₂ separation using Polymer(poly(vinylidene fluoride)-hexafluoropropyl copolymer)- Ionic Liquid(1-ethyl-3-methylimidazolium tetrafluoroborate) gel type membrane

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The polymer-ionic liquid gel membrane is made of a room temperature ionic liquid (1-ethyl-3-methylimidazolium tetrafluoroborate) with physically dispersing in a host polymer (poly(vinylidene fluoride)-hexafluoropropyl copolymer). As the contents of ionic liquid in polymer gels increases, the selectivity of membrane exceeds the 'upper bound', which sets up the limit of general trade-off in between permeability and selectivity. This is due to the solubility selectivity of ionic liquid in polymer gels. The selectivity of membrane with the 2:1 ratio of between ionic liquid and polymer exceeds the upper bound for CO₂/N₂ separation, which has never achieved before for this CO₂ permeability range. In addition, the permeability of this membrane was noticeably different from that of the 0.5:1 membrane (about 9 times greater). The permeability of CO₂ was abruptly increased without decrease of the selectivity and these phenomena were observed firstly in the fields. This simple strategy can be easily used to make extraordinary polymeric membranes.