

Hydrocarbon separation using large pore zeolitic imidazolate frameworks

정진홍, 고동연^{1,†}

KAIST; ¹KAIST 생명화학공학과

(dongyeunkoh@kaist.ac.kr[†])

Metal organic frameworks(MOFs) are microporous crystalline materials with structural versatility and pore tunability. Due to partial organic nature, MOFs are preferred fillers in fabricating the mixed matrix membranes(MMMs) without interfacial voids. Among various MOFs, zeolitic imidazolate frameworks(ZIFs) have gained interest due to its stability under humid conditions and superior molecular sieving properties. Up to date, ZIFs with small pore aperture(typically, 4.5 \AA) have been largely reported and promising separation performances in natural gas processing are investigated. Recently, ZIFs with extra-large pore dimensions(>math>4.5 \text{ \AA}</math>) with 8, 10, and 12-membered ring structure have been reported—these large pores are useful in the separation of hydrocarbons with a kinetic diameter larger than 4.5 \AA . In this study, energy-efficient separation of light-to-heavy hydrocarbons(C4+) will be demonstrated using large pore ZIFs. Sorption isotherm and kinetic uptakes of the hydrocarbons for large pore ZIFs are thoroughly analyzed. Entropic contribution for the diffusion selectivity in ZIFs are investigated and the corresponding membrane separation performance are tested in the form of MMMs.