

The effect of silylation on ETP (ethylene-to-propylene) reaction over SSZ-13 catalyst

김난아^{1,2}, 김주완¹, 김태완¹, 김형주¹, 김철웅^{1,†}, 정용주²¹한국화학연구원; ²한국기술교육대학교(cukim@kriect.re.kr[†])

Propylene is very important raw material for polypropylene, propylene oxide and acrylonitrile, and usually produced from naphtha cracking. The direct conversion of ethylene (or ethanol)-to-propylene attracts much attention recently because of the supply of propylene might be deficient in near future considering the rapid increasing ethylene supply from ethane cracker and shale gas. Ethylene to propylene (ETP) over SSZ-13 catalyst is very interesting considering the high propylene yield and relatively good stability of the catalyst. In this study, ETP reaction was carried out over modified SSZ-13 catalysts at 400°C and 1 atm to investigate for the high selectivity of propylene. SSZ-13 catalyst (Si/Al₂=28) was modified by TEOS treatment and by the methods of ion exchange and incipient for Cu loading to change their catalytic properties. It was found that the amount of deposited SiO₂ was tunable by TEOS treatment and the external Bronsted acid sites of more than 75% was diminished upon two step TEOS treatment. From these results, the external surface passivation induced by two step TEOS treatment resulted in an enhanced selectivity of 20% towards propylene in the ETP reaction when compared pristine one, however Cu loading exhibited a significant loss in ETP activity.