Enhanced reactivity and stability in methane dehydro-aromatization over Mo/HZSM-5 physically mixed with NiO

남기훈, 류혜원, 김도희†
서울대학교
(dohkim@snu.ac.kr†)

While Mo/HZSM-5 is known as a catalyst for methane dehydro-aromatization (MDA), low activity and rapid deactivation have been considered issues to be overcome. In order to improve catalytic performance, NiO was physically mixed with Mo/HZSM-5, which significantly enhanced the yield for aromatic compounds (benzene and toluene), and improved catalytic stability. Combined XRD, CH_4-TPSR, CO chemisorption, TEM-EDS, NH_3-TPD, pyridine FT-IR, TPO, visible Raman, and N_2 physisorption analysis confirmed that NiO promoted the dispersion of MoCx active sites and suppressed coke formation on MoCx, by converting coke precursors to carbon nanotube (CNT) on itself. As a result, after the reaction, the pore size and pore volume did not change much, which is attributed to the improved stability. This study demonstrates that physically mixed NiO can act as an excellent catalyst promotor for MDA.