

Active Phase of Unsupported MoS₂ Catalysts for Slurry Phase Hydrocracking of Vacuum Residue

이용걸[†], 김기덕, 정현록
단국대학교
(yolee@dankook.ac.kr[†])

Mono-layered MoS₂ nanoparticles were successfully synthesized ex situ by ligand stabilization method using Mo(CO)₆ as Mo precursor and trioctylphosphine oxide (TOPO) as a coordinating agent, where nucleation and sulfidation steps played an important role in the formation of nano-sized MoS₂ slab with different size distribution ranging from of 5.6 nm (MoS₂-ES) to 10.5 nm (MoS₂-EL). A high sulfidation temperature gave rise to the formation of a four-layer MoS₂ stack. In addition, mono-layered MoS₂ nanoparticles with a mean diameter from 8.4 nm (MoS₂-IS) to 9.5 nm (MoS₂-IL) were also obtained. EXAFS analysis confirmed that the MoS₂ catalysts obtained by in situ or ex situ methods show the formation of MoS₂ phase with abundance of exposed Mo sites. The activity test results of the MoS₂ catalysts on the VR HCK suggest that the dispersed MoS₂ features abundance of exposed Mo sites that are active for the VR HCK. Moreover, it was demonstrated that the intrinsic activity of the dispersed MoS₂ catalysts in the VR HCK is found to correspond the Mo dispersion based on the rim-site model of hexagonal MoS₂ slabs.