

Reactivity of Nitrogen Compounds in Fluid Catalytic Cracking Light Cycle Oil for Hydrodenitrogenation over CoMoS and NiMoS Catalysts

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Catalytic activities of CoMoS and NiMoS catalysts supported on γ -Al₂O₃ were investigated for the hydrodenitrogen (HDN) of fluid-catalytic cracking light cycle oil (FCC-LCO). The HDN of FCC-LCO was carried out in an autoclave batch reactor at 613 K and 8.6 MPa. The structural properties of catalysts were characterized by N₂ physisorption and X-ray diffraction (XRD). The N compounds in FCC-LCO have been classified into three groups in terms of the reactivity of HDN, where the representative substances of each group were carbazole (CBZ), 1-methyl carbazole (1M-CBZ), and 1,8-dimethyl carbazole (1,8DM-CBZ) for N group 1, 2, and 3, respectively. It was demonstrated that the NiMoS catalyst shows better HDN activity than the CoMoS with the HDN rate constant for the lowest active N compounds of group 3, being 0.05 vs. 0.0006 s⁻¹.