

Catalytic steam cracking of vacuum residue in a fixed-bed reactor with NiK/macroporous Al₂O₃ catalyst

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In this work, macroporous Al₂O₃ supported Ni based catalyst doped with K (NiK/Ma-Al₂O₃) was prepared by the introduction of macroporosity to an alumina support, and applied for catalytic steam cracking of vacuum residue. Catalytic steam cracking of vacuum residue was conducted in a fixed-bed reactor at 500 °C and ambient atmospheric pressure. NiK/macroporous Al₂O₃ catalyst clearly led to a more desirable product distribution—a higher liquid yield and higher conversion than a mesoporous Al₂O₃ supported NiK catalyst (NiK/Me-Al₂O₃). Macroporosity in the alumina support played an important role in improving the accessibility of vacuum residue to the Ni active sites located inside pores, which are involved in the dissociative chemisorption of hydrocarbons and hydrogenation of the radicals thus formed