

Characteristics of Multiphase Flow Catalytic Reactors for Modified Fischer-Tropsch Synthesis

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To control and reduce CO₂ emission, various countermeasures such as capture, storage and utilization have been proposed. One of the advanced concepts to mitigate CO₂ is the catalytic conversion of CO₂ into valuable chemical feedstock, called MFT (Modified Fischer-Tropsch), as it can be developed to commercial process by treating the large amount of CO₂ rapidly. Recently, Fischer-Tropsch synthesis in the advanced multiphase flow reactors has been extensively investigated because of its numerous advantages such as effective heat removal generated from the exothermic reaction and high productivity. In this study, multiphase flow catalytic reactors such as fixed, fluidized and three-phase slurry reactor were employed to the MFT reaction. It has been found that performance of fluidized bed and slurry reactor is superior to the fixed bed reactor from the viewpoint of hydrocarbon productivity and light olefins or heavy waxes selectivity, respectively. Also, the effects of operating variables on the CO₂ conversion and its product distribution in these catalytic reactors will be presented.