

Effects of Phosphorus and Ruthenium on Co/Al₂O₃ Catalysts in a Slurry Bubble Column Reactor for F-T Synthesis

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Fischer-Tropsch synthesis for the production of C₅+ hydrocarbons from syngas was carried out in a slurry bubble column reactor (SBCR, 1"×1 m in height). The Co-based catalysts for FTS were prepared by the conventional wet-impregnation of γ -Al₂O₃. Effects of phosphorus (0–2.0 wt%) and ruthenium (0–0.5 wt%) on Co-based catalysts were examined in the lab-scale SBCR with variations of GHSV (1,000 – 6,000 ml/g/hr), reaction temperature (220 – 240 °C) for the determination of optimum operating condition as well as catalyst in a FTS plant. The promoters such as phosphorus and ruthenium enhanced the activity of Co-based catalysts, however there was an optimum composition of promoters. Furthermore, fresh catalysts and reacted those were analyzed by BET, XRD, TPR and PSD, which explained sufficiently their characteristics in FTS.