Comparison between Fixed Bed Reactor (FBR) and Slurry Bubble Column Reactor (SBCR) for Fischer-Tropsch Synthesis

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Fischer-Tropsch synthesis (FTS) for the production of C_5+ hydrocarbons from syngas was carried out in a tubular fixed bed reactor (TFBR) and in a slurry bubble column reactor (SBCR). The Co-based catalysts for FTS were prepared by the conventional wet-impregnation of γ-Al_2O_3. To compare the conversion and product selectivity of Co/γ-Al2O3 catalyst in the TFBR and SBCR, the operating conditions such as pressure (1.0-3.0 MPa), temperature (210-260 °C) and GHSV (750-6000 ml/g·hr) were employed. C_5+ selectivity in a TFBR is found to be higher than that in a SBCR, whereas olefin selectivity in C_2-C_4 shows a reverse trend. CO conversion and product distribution in a TFBR are more sensitive than those in a SBCR with change in the reaction conditions.