

Comparison of the heterogeneous and the homogeneous flow regimes in a pilot-scale slurry bubble column reactor for the Fischer-Tropsch synthesis

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A rigorous mathematical model of a slurry bubble column reactor (SBCR) for the Fischer-Tropsch synthesis was developed with the gProms model (GTL:SBCR by the Process Systems Enterprise). In order to describe the heterogeneous flow regime, a model for two classes of bubbles (large and small bubbles) was incorporated. The SBCR model also includes multi-compartment model composed of three bubble phases and two slurry phases. On the other hand, it is necessary to predict the behavior of small scale slurry reactors where the flow regime is not heterogeneous but homogeneous. Thus, both of the heterogeneous and homogeneous models were developed and the behavioral characteristics of the two flow regimes were investigated. The gas holdup and its regional profiles, the CO conversion, and the selectivities of hydrocarbons were the primary concern of this study.