Methanol steam reforming kinetics over a commercial $CuO/ZnO/Al_2O_3$ catalyst

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Methanol steam reforming is an attractive method of hydrogen production in small scale. In various methods of hydrogen production with methanol such as methanol partial oxidation and methanol autothermal reforming, methanol steam reforming predominantly affects the hydrogen production rate. In this regard, the kinetics of methanol steam reforming is important in design of various types of reformers using methanol. The purpose of this study is to develop the kinetics of a recent commercial catalyst, Synetix 33-5, which has been found to be most active for the reaction. We used an integral packed-bed reactor to measure the conversion for various feed composition and temperatures. The data was analyzed by a nonlinear regression method to estimate the kinetics parameters. In this effectiveness factor was also computed to account for the effect of the intraparticle diffusion on the reaction rate. Thus obtained kinetics was found to explain the conversion data excellently.