

Dynamic modeling and simulation of gasification reaction in an entrained flow coal gasifier

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A dynamic model of coal gasification has been developed to describe the physical and chemical processes occurring in an entrained gasifier. The entrained flow gasifier, the Texaco downflow entrainment pilot plant gasifier using coal-water slurries as feedstocks, is divided into three zones: the pyrolysis and volatile combustion zone, the char combustion and gasification zone, and the gasification zone. This model is based on mass and energy balances, heterogeneous and homogeneous reaction rates to describe different complex reactions, temperature and concentration profiles along the reactor. The prediction results from this model were in agreement with an experimental data. Parameter studies were made to provide a better understanding of the reactor performance under various operating and inlet feed conditions utilizing the model.