

Effect of Side Reactions (Kinetic) in Furnace and Waste Heat Boiler of Modified Claus Sulfur Recovery Process

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In the reaction furnace of modified Claus process, chemical equilibrium reactions and kinetic reactions occur simultaneously. To calculate the composition and temperature of furnace product, chemical equilibrium reactions and kinetic reactions shall be taken into account. Chemical equilibrium reactions can be calculated using equilibrium constants or Gibbs free energy minimization method easily but, kinetic reactions are limited to calculate due to less kinetic data and studies are accomplished. To estimate kinetic reactions in the Claus furnace, several empirical correlations are adopted to match real plants data. This paper shows the kinetic components (COS and CS₂) resulting from equilibrium calculations using Gibbs free energy minimization and kinetic calculations using empirical correlations. In addition, the estimated kinetic components from empirical correlations are compared with the data from several well-known modified Claus process technology providers. For the other kinetic components (H₂ and CO) resulting from the equilibrium calculation are analyzed to evaluate the impact of the reaction furnace, the waste heat boiler.