KINETICS OF PYROLYSIS AND PARTIAL OXIDATION OF HYDROGEN SULFIDE

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Abstract: Analysis of hydrogen production during the pyrolysis and partial oxidation of H_2S is considered on the basis of detailed kinetic model of hydrogen sulfide oxidation. It has been shown that during H_2S pyrolysis in the flow reactor of finite length, H_2 yield was rather small and the H_2S conversion level was only 13% even at initial temperature $T_0 = 1400$ K. Small addition of air to H_2S results in the fact that the process occurs with the energy release and the acceleration of H_2S conversion. As a result, both the absolute and the relative yield of H_2 increase. For every initial temperature T_0 of the H_2S–air mixture, there is the optimal value of fuel-to-air equivalence ratio ϕ ensuring the maximal yield of H_2. At large values of ϕ and low values of T_0, the partial oxidation process has essentially nonequilibrium character and H_2 concentration at the flow reactor exit can be higher than its equilibrium value. The reasons of extra equilibrium concentration of H_2 at the flow reactor exit have been determined.

Keywords: hydrogen production; hydrogen sulfide; pyrolysis; partial oxidation; kinetic mechanism; modeling

Acknowledgments

This work was supported by the Russian Science Foundation (project No. 16-19-06111) and by the Council of the President of Russian Federation for Support of Young Russian Scientists and Leading Scientific Schools (grant SS-7018-2016.8).

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Received January 10, 2016

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