

Decomposition of Hydrogen Iodide in a Sulfur-Iodine Cycle: Experiments and Process modeling

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The decomposition of hydrogen iodide (HI) over Platinum/alumina is conducted in a lab-scale tubular-flow reactor at atmospheric pressure and at the temperatures ranging from 350 – 550oC. A kinetic model of the decomposition in the form of Langmuir-Hinshelwood type is developed based on the experimental data where the surface reaction is considered as the rate-determining step.

Numerical results obtained from the proposed model are in agreement with the measurements. Also, the effects of the operating conditions and the composition of the feeding solution on the performance of the decomposition are analyzed by means of process modeling. It is shown that the conversion of hydrogen iodide obtained from the kinetic model is significantly decreased in the presence of iodine while the decomposition efficiency is slightly affected by the reaction temperature.