

Sani Aranyabandhu 2008: Effect of Noise and Uncertainty of Pulse Size in TAP Experiment on Accuracy of the Estimated Reaction Rate Constant. Master of Engineering (Chemical Engineering), Major Field: Chemical Engineering, Department of Chemical Engineering. Thesis Advisor: Associate Professor Metta Chareonpanich, D.Eng. 55 pages.

TAP technique is used for heterogeneous catalysis reaction study. The TAP experiment is performed by injecting small amount of gas into a microreactor packed with solid catalyst. The gas that leaves the microreactor is monitored by a mass spectrometer providing a time-dependent pulse response. The size and shape of the response depend on transport phenomena and chemical kinetics in the reactor. The objective of this research is to study the effect of noise and uncertainty of pulse size on the accuracy of the estimated chemical kinetic parameter. The accuracy is indicated by the percentage difference between the real and the estimated first order reaction rate constants. When using the conversion expression to estimate the reaction rate constant, the measured variable is the ratio of the area of the reactant gas to the area of the inert gas (r_a). The deviation in r_a was experimental measured and found to be $\pm 8.59\%$. The deviation in experimental mean residence time was found to be $\pm 1.04\%$. The calculation results showed that the percentage difference of the reaction rate constant estimated from the conversion expression is much higher than that from the mean residence time expression due to high deviation in r_a .

Student's signature

Thesis Advisor's signature

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