

Rapeeporn Ekjamnong 2011: Investigation of Accuracy of Different Procedures for Estimating the Gas Diffusivity and the First Order Irreversible Reaction Rate Constant from TAP Pulse Responses. Master of Engineering (Chemical Engineering), Major Field: Chemical Engineering, Department of Chemical Engineering. Thesis Advisor: Associate Professor Phungphai Phanawadee, D.Sc. 119 pages.

A transient experiment called “temporal analysis of products” (TAP) has been increasingly applied for heterogeneous catalytic reaction studies. The kinetic parameters from the TAP experimental response can be determined by using different estimation procedures including 1) determination of the kinetic parameters after transport parameter determination, and 2) determination of the kinetic and transport parameters simultaneously. In this work, the effect of different procedures on the accuracy of estimated transport and kinetic parameters are theoretical investigated for the first order irreversible reaction case under a non-ideal inlet flow condition. A more accurate procedure is the one which gives a lower deviation of the estimated parameters from the real values. Simulation results show that for the one-zone reactor, the first procedure provides the most accurate of estimated diffusivity and reaction rate constant. In addition, the exit flow rate curve fitting gives more accurate results than the unit-area normalized response fitting. Similar results are obtained for three-zone reactor case.

Student's signature

Thesis Advisor's signature

____ / ____ / ____