

Kwanhatai Jiradechkhajorn 2011: TS-CM Technique for Transient Kinetic Study in CSTR: Sampling Frequency and Digital Noise Filtering. Master of Engineering (Chemical Engineering), Major Field: Chemical Engineering, Department of Chemical Engineering. Thesis Advisor: Assistant Professor Attasak Jaree, Ph.D. 78 pages.

Temperature Scanning and Composition Modulation technique (TS-CM) is a new technique for estimating reaction parameters under transient conditions in a CSTR reactor. Studies of reaction kinetics performed under transient conditions can lead to savings of time and resources as compared to the conventional steady-state method. This is because a collection of kinetic data can be obtained within a single experiment. This research focused on the refinement of TS-CM technique as an efficient tool for reaction kinetic studies. Different degrees of noise intensity were added to the output signal of NaOH concentration in order to study the effect of noise (0.5, 1.0, 3.0 and 5.0 %) and sampling period (1, 30 and 60 seconds) on the accuracy of reaction kinetics. Results showed that, the sampling period of 1 second gave only slight errors of kinetic parameters compared to that of without noise. The noise filtering method was also studied. In order to smooth the NaOH concentration data, TS-CM technique was applied with three digital filters: a) the first-order filter b) the second-order filter and c) the savitzky-golay filter. The results show that, the best filter was savitzky-golay which filtered with 81 points of window size and 2th order of polynomial degree.

Student's signature

Thesis Advisor's signature