

A First Course on Kinetics and Reaction Engineering

Problem 15.2

Problem Purpose

This problem will help you determine whether you have mastered the learning objectives for this unit.

Problem Statement

Suppose you are studying the kinetics of the gas phase condensation, reaction (1), using a 600 cm³ perfectly mixed batch reactor. In one experiment you charged the reactor with 2.3 atm of A and 2.0 atm of B (no Z was initially present) at 300 K and then recorded the total pressure as a function of time. The resulting data are presented in Table 1. For this one set of experimental data, does the rate expression given in equation (2) provide an adequate description of the reaction kinetics? If so, what is the best value for the rate coefficient, and what is the uncertainty in that value?



$$r_1 = k_1 P_A P_B \quad (2)$$

Table 1.

<i>Elapsed Time (s)</i>	<i>Total Pressure (atm)</i>
0	4.32
15	4.08
30	4.03
45	3.97
60	4.00
120	3.55
240	3.22
300	3.13
600	2.87
1000	2.67
1500	2.53
2000	2.43