

AFCoKaRE Practice Problem 15.5

Purpose: This problem allows you to practice the analysis of kinetics data obtained using a PFR.

Problem Statement: Suppose that the gas phase decomposition of A, reaction (1), was studied in an isothermal, isobaric, steady-state PFR. In every experiment the temperature was 675 K, the pressure was 1 atm, and the feed was pure A, an ideal gas. The space time was varied from one experiment to the next, and the fractional conversion of A was measured. Using the resulting data, shown in Table 1, determine whether the rate expression in equation (2) accurately predicts the reaction kinetics. If it does, determine the best value for the rate coefficient, including 95% confidence limits.



$$r_1 = k_1 C_A \quad (2)$$

Table 1. PFR Kinetics Data for AFCoKaRE Problem 15.5

<i>Space Time (s)</i>	<i>Fractional Conversion</i>
10	0.055
20	0.105
50	0.229
100	0.383
150	0.496
200	0.583
250	0.652
300	0.706
350	0.753
400	0.79