AFCoKaRE Practice Problem 33.1

Purpose: This problem will allow you to practice the quantitative analysis of a tubular reactor with axial dispersion.

Problem Statement: Gas phase A, at 10 atm and 100 ºC is fed at a rate of 23,000 L min^{-1} to a 2 in diameter, isothermal tubular reactor that is 8 ft long. The reactor temperature is 100 ºC and pressure drop in the reactor is negligible. Reversible reaction (1) takes place at a rate described by equation (2). At the operating temperature, k_f = 4750 min^{-1} and k_r = 4300 min^{-1}. Calculate the conversion of A if the axial dispersion coefficient is equal to 5.5 x 10^5 dm^2 min^{-1}.

$$A \rightleftarrows Z \qquad (1)$$

$$r = k_f C_A - k_r C_Z \qquad (2)$$