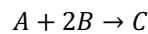


CHG 3127 Tutorial Session 3: (2020-01-30)

Question A

The following gas phase reaction takes place in a 400 L CSTR:



The molar feed to the CSTR consists of 30% A, 65% B and 5% inert material I. The reaction rate law is given below, where the numerical values for k_A , K_A , and K_B are 0.2 L/mol/min, 0.8 L/mol and 1.2 L/mol respectively.

$$-r_A = k_A \frac{C_A^2}{1 + K_A C_A + K_B C_B}$$

The total volumetric flow rate to the reactor is 25 L/min at a total molar concentration of 5 mol/L.

Using the full design procedure outlined in lecture and in the design document provided on Brightspace, determine the fractional conversion of the limiting reactant exiting the reactor. Your solution should be accurate to within 0.005.

Question B

Assuming the CSTR is replaced with a PFR of the same volume, determine the exit fractional conversion. *Again, you must use the full design procedure. Your solution should be accurate to within ± 0.0001 . (Assume a value of 0.005 as the maximum initial change in fractional conversion using Euler's method.)*