Unit 8 - Week 6: Reactor Design for Single Reactions

Assignment 6

The due date for submitting this assignment has passed. As per our norms you have not submitted this assignment.

1. a) In a reactor at constant volume:
   i) The reactor is made up in large excesses.
   ii) Both the reactants have the same concentration.
   iii) Both the products are present in low concentration.

   Due date: 2019-09-11, 23:59:57.
   No. of attempts: 5

2. The concentration ratio for the reaction $\text{A} \rightarrow \text{B} + \text{C}$ is shown in the following graph. Here, $\text{C}_0$ and $\text{F}_0$ represent the rate of reaction and concentration of reactant A. The final is poor and $98\%$ conversion is required.

   Which one of the following configurations gives the lowest total volume of the reactor?

   \[ \text{A} \rightarrow \text{B} + \text{C} \]

   Due date: 2019-09-11, 23:59:57
   No. of attempts: 5

3. Which one of the following configurations gives the lowest total volume of the reactor?

   \[ \text{A} \rightarrow \text{B} + \text{C} \]

   Due date: 2019-09-11, 23:59:57
   No. of attempts: 5

4. a) A fixed bed CSTR followed by an ideal PFR
   b) A fixed bed CSTR followed by a plug flow reactor (PFR)
   c) A fixed bed PFR followed by a CSTR
   d) A plug flow reactor (PFR) followed by a CSTR

   Which one of the following configurations gives the lowest total volume of the reactor?

   Due date: 2019-09-11, 23:59:57
   No. of attempts: 5

5. a) An ideal CSTR followed by an ideal PFR

   b) A fixed bed CSTR followed by a plug flow reactor (PFR)

   Which one of the following configurations gives the lowest total volume of the reactor?

   Due date: 2019-09-11, 23:59:57
   No. of attempts: 5

6. The liquid phase reaction $\text{A} + \text{B} \rightarrow \text{C}$ is conducted isothermally at 50°C in an ideal continuous stirred tank reactor (CSTR). The initial concentration of $\text{A}$ is 5.0 $\text{mol/L}$. At a space time of 3.0 $\text{h}$, the concentration of $\text{A}$ at the end of the CSTR is 4.0 $\text{mol/L}$. The kinetics of the reaction $\text{A} \rightarrow \text{B} + \text{C}$ is $\text{A} - \text{B} + \text{C}$ and the plug flow reactor (PFR) of the same volume is used in series after the existing CSTR.

   Which one of the following is correct for this reaction at 50°C?

   1. $\text{A} - \text{B} + \text{C}$
   2. $\text{A} - \text{B} + \text{C}$
   3. $\text{A} - \text{B} + \text{C}$
   4. $\text{A} - \text{B} + \text{C}$

   Due date: 2019-09-11, 23:59:57
   No. of attempts: 5

7. a) In a fixed bed PFR followed by an ideal CSTR

   b) In a fixed bed CSTR followed by a plug flow reactor (PFR)

   Which one of the following configurations gives the lowest total volume of the reactor?

   Due date: 2019-09-11, 23:59:57
   No. of attempts: 5

8. a) A simple chemical reaction $\text{A} \rightarrow \text{B}$ is being carried out in two ideal continuous stirred tank reactors (CSTRs) connected in series as shown in the following figure. The volume of the first reactor is 2.3 times that of the second reactor. The temperature of the reactor is such that the reactant in the first reactor is 1.5 times the one consisting in the second reactor. Then the order of the reaction will be _______ (rounded off to two decimal places).

   Due date: 2019-09-11, 23:59:57
   No. of attempts: 5