

Parameter Values for Reactor Problem

V	$=$	0.01	m^3
C_{A0}	$=$	1	$kgmol/m^3$
ρ	$=$	1000	kg/m^3
C_p	$=$	1	$kJ/kg/K$
$(-\Delta H_1)$	$=$	3.94×10^4	$kJ/kgmole$
$(-\Delta H_2)$	$=$	7.48×10^4	$kJ/kgmole$
$(-\Delta H_3)$	$=$	5.94×10^4	$kJ/kgmole$
T_0	$=$	150	$^{\circ}C$
k_{10}	$=$	100	s^{-1}
k_{20}	$=$	150	s^{-1}
k_{30}	$=$	1.1	$m^3/(kgmole)/s$
E_1	$=$	3.09×10^4	$kJ/Kgmole/K$
E_2	$=$	4.18×10^4	$kJ/Kgmole/K$
E_3	$=$	2.10×10^4	$kJ/Kgmole/K$

- The rate constants, k_i are related to temperature by:

$$k_i = k_{i0} \exp\left(-\frac{E_i}{RT}\right)$$

- There are 3 reactions occurring in the CSTR. The associated heats of reaction are given in the table below:

	reaction	heat of reaction
1	$A \rightarrow B$	$(-\Delta H_1)$
2	$B \rightarrow C$	$(-\Delta H_2)$
3	$2A \rightarrow D$	$(-\Delta H_3)$

- The reactions are exothermic as you can tell from the values of the heats of reaction. Thus Q will be a negative value.

Steady State Values of Inputs

$$\begin{aligned} F_s &= 8 \times 10^{-5} \quad m^3/s \\ Q_s &= -7.5 \quad kJ/s \end{aligned}$$