

ChBE 4300(A) – Kinetics and Reactor Design

School of Chemical & Biomolecular Engineering

Georgia Institute of Technology

Spring 2014

Quiz #6 – April 11th, 2014

Closed Book, 10 minutes

The following equations describe the heat generated and removed in a steady-state CSTR.

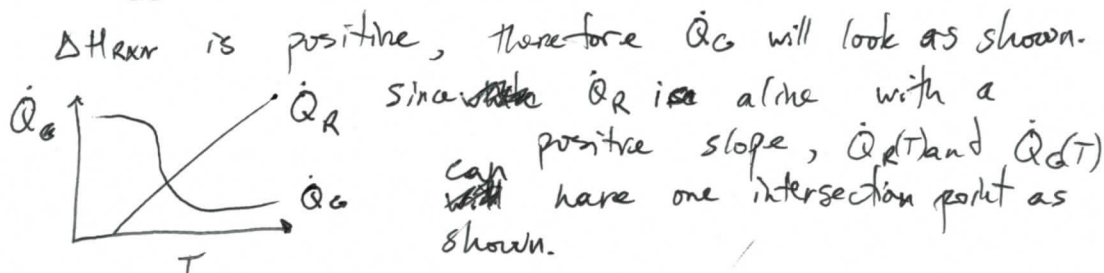
$$\dot{Q}_G = \frac{-\Delta H_{rxn} F_{A0} X}{\rho \bar{C}_p V}$$

$$\dot{Q}_R = \frac{T - T_o}{\tau} + \frac{hA(T - T_c)}{\rho \bar{C}_p V}$$

1) True or False. Using the equations above, explain why for each.

a. Endothermic reactions taking place in CSTRs can exhibit multiple steady states.

False.



b. Changing the inlet feed temperature can modify the number of possible steady-states.

True.

$$\dot{Q}_R(T) = \frac{T}{\tau} - \frac{T_o}{\tau} + \frac{hA}{\rho \bar{C}_p V} (T) - \frac{hA}{\rho \bar{C}_p V} T_c$$

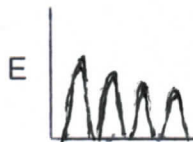
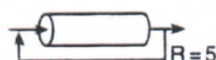
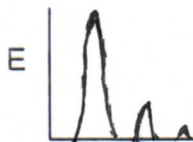
$$\dot{Q}_R(T) = \left(\frac{1}{\tau} + \frac{hA}{\rho \bar{C}_p V} \right) T - \left(\frac{T_o}{\tau} + \frac{hA}{\rho \bar{C}_p V} T_c \right)$$

$$y = mx + b$$

changing T_o will change the y-intercept of \dot{Q}_R line and will shift the const. slope line on Temp. axis accordingly.

2) Sketch the RTDs for the following reactor configurations:

+ 4



* See H.W. 9 problem 3 solutions