

Chemical Kinetics and Reactor Design—Spring 2016

Homework 1 **Due: Friday, January 29**
2.1, 2.2, 2.3, 2.4

Homework 2 **Due: Friday, February 5**
3.1, 3.2, 3.3

Homework 3 **Due: Friday, February 12**
4.1, 4.2, 4.4

Homework 4 **Due: Friday, February 19**
4.3, 4.5, 4.7

EXAM 1. Thursday, February 18

Homework 5 **Due: Friday, February 26**
4.8, 4.12,

Revisit Exercise 3 of Exam 1 and answer the following.

1. Solve the problem numerically for $c_A(t)$, $c_C(t)$, $c_D(t)$ using the following parameter values

$$c_{A0} = 1 \text{ mol/L} \quad (k_1 c_{B0}) = 2 \text{ L}/(\text{mol}\cdot\text{hr}) \quad (k_2 c_{B0}) = 1 \text{ hr}^{-1}$$

Check your analytical solution for $c_A(t)$ from Exam 1

2. Define

$$s_C = \frac{R_C}{-R_A} \quad S_C = \frac{n_C - n_{C0}}{n_{A0} - n_A} \quad x_A = \frac{n_{A0} - n_A}{n_{A0}}$$

Plot s_C , S_C , x_A versus time from your numerical solution.

3. Let's say that you have done an economic analysis of this process and decided that you need greater than 80 percent conversion of A and greater than 50 percent yield of C. Are these two requirements feasible? If so, what batch time do you choose for this application?
4. Make a plot of S_C versus x_A . What is the largest yield of C possible for 80 percent conversion of A? What is the largest conversion of A possible for 50 percent yield of C?

Homework 6

4.13, 5.1, 5.8, 5.9

Due: Friday, March 4**Homework 7**

5.2, 5.6, 5.10, 5.29

Due: Friday, March 11

See the "Latest Exercises" link on jbrwww.che.wisc.edu/home/jbraw/chemreacfun for Exercise 5.29. Exercise 5.28 is the batch reactor version that I solved in class. Exercise 5.29 is for the CSTR.

EXAM 2. Tuesday, March 15**Homework 8**

5.11, 5.12, 5.13, 5.17

Due: Friday, March 18**Spring Break****Homework 9**

6.1, 6.2, 6.3, 4.34

Due: Friday, April 1

See the "Latest Exercises" link on jbrwww.che.wisc.edu/home/jbraw/chemreacfun for Exercise 4.34, in which we revisit Problem 2 from Exam 2.

Homework 10

6.6, 6.8, 6.14

Due: Friday, April 8**Homework 11**

6.15, 6.20, 7.1

Due: Friday, April 15**EXAM 3. Tuesday, April 19****Homework 12**

7.10, 7.14, 8.1

Due: Friday, April 22**Homework 13**

8.2, 8.9

Due: Friday, April 29**Homework 14**

9.3, 9.5, 9.6

Due: Friday, May 6**FINAL EXAM. Sunday, May 8**