

P-8.9 Liquid phase batch reactor

a) Mole balance

Sp. A: $\frac{dC_A}{dt} = r_A$ — (1)

$$-r_A = k_1 C_A$$

Sp. B: $\frac{dC_B}{dt} = r_B$ — (2)

$$r_B = k_1 C_A - k_2 C_B$$

Sp. C: $\frac{dC_C}{dt} = r_C$ — (3)

$$r_C = k_2 C_B$$

Solve eq. (1), (2), and (3) simultaneously using ODE solver to get plot of C_A, C_B, C_C with time

b) Similar to part (a) except for two rate laws

$$r_A = k_{-1} C_B - k_1 C_A$$

$$r_B = k_1 C_A - k_{-1} C_B - k_2 C_B$$

c) Similar to part (a),(b) except for r_C

$$r_C = k_2 C_B - k_{-2} C_C$$

e) Can be discussed based on plots.