ASSIGNMENT 4
CHE331A

1. Consider the aqueous reactions

    A +B → R, desired $r_R = 4.0\ C_A^2\ C_B^{0.5}$, mol/liter·min
    A +B → S, undesired $r_S = 2.0\ C_A\ C_B^2$, mol/liter·min
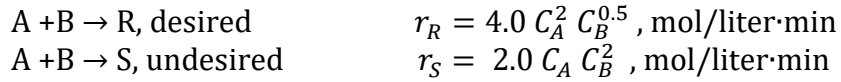
    equal volumetric flow rates of the A and of B streams are fed to the reactor,
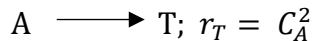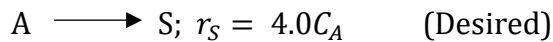   and each stream has a concentration of 40 mol/liter of reactant.
    a) Find C_R and C_S for $X_A = 0.9$ in a Plug flow reactor.
    b) Find C_R and C_S for $X_A = 0.9$ in a Mixed flow reactor.
    c) Find the maximum concentration of desired product in plug flow reactor.

2. Consider liquid phase reaction:

    A ⟶ R; $r_R = k_1 C_A$ (Desired)

    A ⟶ S; $r_S = k_2 C_A^2$ (Undesired)
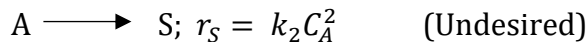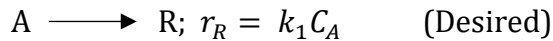
    This reaction occurs in two CSTRs in series with τ_1 = 5 min and τ_2 = 15 min. The feed
    entering first CSTR has the compositions: C_{A0} = 2.0 mol/liter, C_{R0} = 0.2 mol/liter, C_{S0}
    = 0.3 mol/liter. Composition of stream leaving first CSTR is C_{A1} = 1.2 mol/liter, C_{R1} =
    0.8 mol/liter, C_{S1} = 0.5 mol/liter. Find the exit composition of second reactor.

3. Consider the parallel reaction in liquid phase:
    A ⟶ R; $r_R = 4.0$
    A ⟶ S; $r_S = 4.0 C_A$ (Desired)
    A ⟶ T; $r_T = C_A^2$
    Initial concentration of A , C_{A0} =6 mol/liter. For an isothermal operation, find the
    maximum expected concentration of S in
    a) PFR
    b) CSTR