

KSU – Chemical Engineering Department
ChE 320 (Chemical Reactor Engineering) – TUT #6

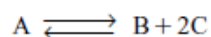
Name:

ID:

SN:

1. Solve example 6.1 using Polymath, to produce 30 ton of NO, at 450°C.
2. Solve Problem 6.6 (a, b, c), using Polymath.

(Membrane reactor) The first-order, gas-phase, reversible reaction



is taking place in a membrane reactor. Pure A enters the reactor, and B diffuses out through the membrane. Unfortunately, a small amount of the reactant A also diffuses through the membrane.

- (a) Plot and analyze the flow rates of A, B, and C and the conversion X down the reactor, as well as the flow rates of A and B through the membrane.
- (b) Next, compare the conversion profiles in a conventional PFR with those of a membrane reactor from part (a). What generalizations can you make?
- (c) Would the conversion of A be greater or smaller if C were diffusing out instead of B?

Additional information:

$$\begin{array}{ll} k = 10 \text{ min}^{-1} & F_{A0} = 100 \text{ mol/min} \\ K_C = 0.01 \text{ mol}^2/\text{dm}^6 & v_0 = 100 \text{ dm}^3/\text{min} \\ k_{CA} = 1 \text{ min}^{-1} & V_{\text{reactor}} = 20 \text{ dm}^3 \\ k_{CB} = 40 \text{ min}^{-1} & \end{array}$$