## **Special Problem 4**

## **Transient Balances**

A tank of liquid phosphorous acid initially holds 150 kmols and the initial mole fraction is 0.05. The liquid is 95 mol% water. A stream of pure phosphorous acid flows into the tank at 350 mol/min. Liquid exits the tank at 350 mol/min. The tank contains a really good mixer, so the mole fraction in the exit stream at any time is the same as the average mole fraction in the tank at that same time.

- (a) Write the transient mole balance for phosphorous acid in the tank in terms of the mole fraction of phosphorous acid in the tank (y<sub>P</sub>).
- (b) Solve the transient equation to find an expression for the  $y_P$  as a function of time.
- (c) How long will it take to reach a mole fraction of 0.5?