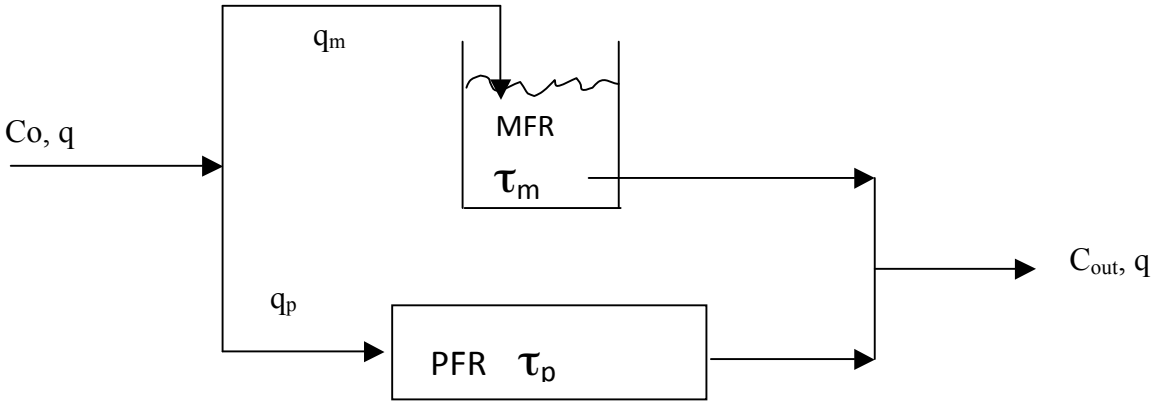
Problem 1.
Derive the equation giving C_{out} as a function of Co, q_m, q_p, τ_m, τ_p, and k, assuming an zero order reaction occurs in the ideal reactors of this steady state system.



Assume outlet concentrations of each reactor are C_m and C_p, respectively.

Problem 2.

An enzymatic reaction is conducted in 2 ideal reactors in series (1 mfr, 1 pfr).

Data:
Km = 10 mol/L Vm = 5 mol/L-min Co = 100 mol/L q = 15 L/min
MFR volume = 300 L PFR volume = 150 L

a. Calculate the overall conversion if the MFR is first.

b. Calculate the overall conversion if the PFR is first.

Problem 3.

A pulse tracer of dye is injected into the product stream of a reactor. The color of the output stream is recorded at five second intervals.
Plot the E(t) curve for this system.

$$t := \begin{pmatrix} 0 \\ 5 \\ 10 \\ 15 \\ 20 \\ 25 \\ 30 \\ 35 \\ 40 \end{pmatrix} \qquad ph_{out} := \begin{pmatrix} 0 \\ 3 \\ 4 \\ 5 \\ 5 \\ 4 \\ 2 \\ 1 \\ 0 \end{pmatrix}$$