Mass Balance–CMFR with Conservative Pollutant

CENG 340–Introduction to Environmental Engineering
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(Example 4.5 in *Environmental Engineering* by Mihelcic and Zimmerman)

A completely mixed stirred reactor (CMFR) contains clean water prior to being started. After start-up, a waste stream containing 100 mg/L of a conservative pollutant is added to the reactor at a flow rate of 50 $\frac{m^3}{day}$. The volume of the reactor is 500 m^3. What is the concentration exiting the reactor as function of time after it is started.

Step 1:

Determine whether the system is at steady state or not.

Step 2:

Draw a mass balance diagram.

Step 3:

Write a mass balance equation:

Step 4:

Solve the mass balance equation: