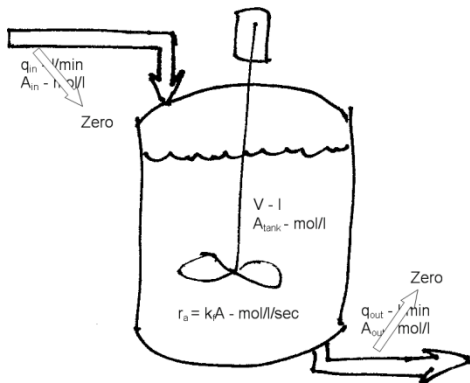


Batch Reactor Balance Exercise

A batch reactor looks like a CSTR with no flow in or out. Hey! This is a freebie!

However, there is no steady state in a batch reactor. That would just be a storage tank and not a reactor.

First order kinetics – derive from your CSTR balance



Go back to your CSTR exercise. Copy your *dynamic* CSTR balance (by the first star) here:

Now, the batch reactor is the same, but has no flow in or out, so strike out those terms. Write it here cleanly:

We are using all clean simple assumptions, so there is no volume change on reaction. There is no flow, so the volume will be constant. That means you can bring V outside the derivative. Write that.

Notice that V is on both sides. Cancel it.

Compute the units of each term in your balance and be sure they are consistent.

You've just written a batch reactor balance for first order irreversible kinetics.

Algebra won't do for this, like the steady state CSTR. You'll need calculus to solve it. Don't solve it now, just steel yourself...