theory.

Questions for Further Study

- ***Question #1:*** Derive the model equations considering one mode of start-up, *e.g.,* adding both reactants simultaneously, until the reactor overflows.
- ***Question #2:*** Consider an emergency shutdown in which the feed flows are suddenly stopped and the reactor is to be drained. Would the equations for this case be different from those representing start-up? How?
- ***Question #3:*** Repeat the above calculations using a first-order reaction.[9] Is it going to affect the controller settings and activation?
- ***Question #4:*** What would be the effect of adding a derivative action to the controller (*i.e.,* using a PID) on the start-up of the process?

NOMENCLATURE

C_i	concentration of species i, mole/l
C_{if}	feed concentration of species i, mole/l
C_i^{sp}	concentration set point for species i, mole/l
C_{pi}	heat capacity of species i, J/mole °C
C_{vi}	characteristic constant for valve i
D	reactor diameter, m
F_1	feed flow rate of pure component A, 1/min
F_2	feed flow rate of pure component B, l/min
h_{air}	heat transfer coefficient for air, kJ/m^2°C min
ΔH	standard heat of reaction, kJ/mole
K	reaction rate constant, l/mole min
k_{ci}	controller gain for loop i
k_p	process gain
k_p,av	average process gain
Q	rate of heat loss to the surrounding, kJ/min
r	reaction rate, mole/l min
R	gas constant, 0.008314 kJ/mole K
T	reactor temperature, °C
T_{amb}	ambient temperature, °C
T_f	feed temperature, °C
T_{ref}	reference temperature, °C
t	time, min
V	fluid volume, 1
v_i	valve i position
v_{io}	initial position for valve i
V_r	reactor volume, 1
λ	IMC filter (closed-loop time constant)
τ	process time constant
τ_{av}	average time constant
τ_1	integral time for PI controller

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ChE letter to the editor

To the Editor:

In the Winter 2000 issue of *Chemical Engineering Education* there was an interesting paper by S.H. Munson-McGee[1] that presented a laboratory sequence with the objective of developing abilities in chemical engineering students according to EC 2000 criteria.[2] The author describes a four-course sequence, beginning with the study of the theoretical aspects of experimental design and data analysis and finishing with a unit operations laboratory.

Table 1 of that paper shows a short description of each of the nine experiments that can be carried out by the students with the Process Instrumentation Laboratory course. Unfortunately, the mentioned Table 1 contains a typographical mistake and the simple change of a "d" for a "b" causes a considerable conceptual effect: effectively, the experiment, titled "A*b*sorption by activated carbon. Blue food coloring was a*b*sorbed from aqueous solutions..." is actually an a*d*sorption experiment. (Table 2 refers, correctly, to this experiment as an a*d*sorption process.)

From my point of view, it is important to correct this type of typographical error where two very similar words refer to two very different processes, in order to prevent confusion and conceptual mistakes among students. This is especially important in journals such as *Chemical Engineering Education* because of its content, which is very readable by chemical engineering undergraduates.

Amparo Gómez Siurana
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2. "Engineering Criteria 2000," Accreditation Board for Engineering and Technology, Inc., 111 Market Place, Suite 1050, Baltimore, MD (1998) ❐