Team exercise

Consider an autocatalytic reaction \( A \rightarrow B \) with \( -\frac{\text{d}[A]}{\text{d}t} = k_2 [A] [B] \). It is said to be autocatalytic because a higher concentration of the product \( B \) increases the rate of the production of that same product \( B \). Autocatalytic reactions are common in biological systems.

We wish to process 1.5 L/s of feed, with \( [A_0] = 10 \text{ mol/L} \). Four 100-L mixed reactors are available, and may be configured in any manner (series, parallel, multiple feeds, etc.) Suggest a configuration to maximize the production rate of \( B \). Sketch your recommended design and calculate the conversion.

**Data:** \( k_2 = 0.001 \text{ L/(mol s)} \).

(A) Brainstorm. Make a list of as many possible configurations as you can imagine. You should be able to find LOTS of possibilities. Seek information, if necessary. At this stage, don't evaluate- just make a long list. (5 minutes)

(B) Now, evaluate. Each group should recommend exactly one configuration, and explain why that configuration appears optimal.