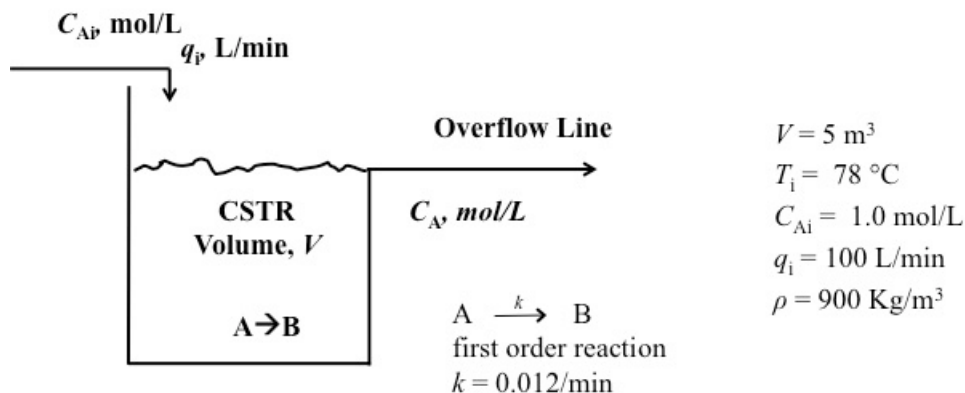


CBE 454 Fall 2016

Design Project

Due on **Learn** on **13-Dec-2016**, submission will open on 12-Dec. Late submissions disallowed. Parts of this project statement will be updated with more details and/or corrections, which will be notified in the class too. It is your responsibility to make sure your final submissions addresses all the required items.



Part 1: Analyze the dynamics of the reaction process occurring in a CSTR, as outlined in the above scheme. Necessary process variables are provided. The feed rate and the inlet concentration can vary with time. The analysis should include

- Set up a dynamic model for the process, accompanied by assumptions.
- Simulate the process on SIMULINK, and obtain the steady-state product concentration.

Part 2: Design a feedback control system for the process. The objective is to obtain a desired reaction extent or product concentration.

- Specify the controlled variable (CV), manipulated variable (MV), and the disturbance variable(s) (DV).
- Draw a schematic of the feedback control strategy and simulate on the SIMULINK model.
- Obtaining a transfer-function model for the process using a step-test method (or any other method).
- Designing three controllers (e.g., IMC, ITAE, Direct-Synthesis, Ziegler-Nichols, etc.,) for the system
- Show and compare the performance of all the three and discuss their relative advantages/disadvantages.

Part 3: Submit a PDF report of the project, not exceeding 10 pages.

Particulars to include in the report will follow in due course.