

For report 2, do the following:

1. Is the CSTR stable under the following *nominal* conditions?

Coolant flow 450 kmol/hr

Feed Temperature $24 \text{ }^\circ\text{C}$

Propylene Oxide in Feed 20 kmol/hr

Perform a linear stability analysis to answer the above question.

2. Design a distillation column in CHEMCAD that takes the reactor outlet under *nominal conditions* and gives a bottoms product that is 99.5% propylene glycol. Show the CHEMCAD simulation results.
3. What happens in the CHEMCAD simulation when the propylene glycol in the feed to the column is increased or decreased by 10%?
4. Suppose the CSTR is operating at a coolant flow rate of 450 kmol/hr and a propylene oxide feed rate of 20 kmol/hr . The initial feed temperature is $20 \text{ }^\circ\text{C}$. Design a PI controller in MATLAB that keeps the outlet propylene glycol concentration at 0.50 kmol/m^3 . Show the plots of the feed temperature versus time and the propylene glycol concentration in the outlet versus time.
5. Implement the above controller in CHEMCAD.