

# CH 4250: Process Engineering

## Assignment 2

Name: \_\_\_\_\_ Roll No: \_\_\_\_\_

Develop a flowsheet in Aspen Plus to simulate the following process.

A feed stream (saturated liquid at 1 atm) at a flow rate of 100 lbmol/hr containing an equimolar mixture of butanol and isobutanol is distilled in an atmospheric column.

Some specifications:

1. Use the UNIQUAC thermodynamic model
2. Distillation column has 25 trays, with the feed entering at the top of the 15<sup>th</sup> tray; Total distillate flow is  $\frac{1}{2}$  the inlet flow and nominal reflux ratio is 15; Total condenser can be used.

Answer the following questions:

1. What is the concentration of butanol in the distillate stream?
2. Take the last four digits of your roll number (i.e., abcd, if your roll number is CH18**ab**bc). Identify a set of conditions under which the butanol concentration in the distillate is less than 0.bc lbmol/hr.
3. Show in a graph the tradeoff between the number of trays and reboiler heat duty to meet the objective in (2).
4. Identify the reflux rate at which you can obtain a isobutanol recovery of **9a.bc%** in the distillate stream. (recovery = the amount in distillate stream / amount in feed stream x 100)
5. Use the "Design Specification" and "Vary" feature in the Radfrac block to achieve the specification in (4).

### Deliverables (DUE DATE: 6 Feb 2022, 11:00pm)

1. Two page report in pdf format
2. Aspen Plus file (named as per your Roll Number)