CH 2180 - Separation processes - 2022 batch -Distillation Column Design Assignment

Group 5

Design a distillation column with a total condenser and a partial reboiler for the following separation.

Data:

System : n-Hexane-n-Heptane — Operating pressure : 1 bar

Feed rate : 50 kmol/hr — Feed condition : saturated liquid

Feed composition: 25 mol% hexane — Distillate composition: 95 mol% hexane

85 % of hexane recovery is required.

Column type : Sieve tray column

Operating condition : 80 Percent of flooding

Obtain equilibrium data for the system from 'Vapour Pressure Data' available in Moodle page.

Estimate the tray and/or column **efficiency** and assume a suitable reflux ratio, down comer type and area and calculate the ***Actual number of stages required***, the ***Height*** and the ***Diameter*** of the column, ***Size and the Number of holes in a tray, tray spacing*** and the ***feed tray location.*** Check the design for satisfactory operation.

The report should include the given problem, detail calculations, graphical constructions, data used for the calculation, assumptions made and the references. Mechanical design and the drawings are not required. Mc-cabe and Thiele method or Ponchan-Savarit method can be used. All the important information should be summarised in the last page of the report.