AHMEDABAD UNIVERSITY
School of Engineering and Applied Science
2025-2026 Winter

CHE406 Separation Processes
Mid-Term Examination
Saturday 21 February 2026. 14:00 - 15:30

Name:	Roll no.	A	U	2						Marks /25

Instructions:

This is a No Book –No Notes Examination. Answer all questions. All parts of a question must be answered together. Please do not raise any queries with the invigilators. In case of insufficient information, if any, make and mention suitable assumptions and proceed further.

Q.1 A mixture consisting of 60 mol% benzene and the rest toluene is subjected to simple distillation at 101.3 kPa at a rate of 100 kmol/h. The equilibrium data for benzene –toluene system at 101.3 kPa.

T (K)	383. 8	379.6	375.5	371.8	368.4	365.7	362.7	360.2	357.8	355.6	354.4	353.3
x	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	0.95	1
y	0	0.205	0.369	0.502	0.618	0.706	0.789	0.849	0.907	0.955	0.978	1

a) Determine the amount of products obtained and the composition of distillate if the residue remaining in the still has a composition of 30 mol % benzene. **[12M]**
b) Determine the fraction of feed vaporized. **[3M]**

Q.2 Benzaldehyde (MW106) contaminated with small amounts of a nonvolatile impurity is purified by steam distillation at a total pressure of 1 atm. Saturated steam at 1 atm is passed through a charge consisting of 100 kg of benzaldehyde taken in the still. Determine

(a) The distillation temperature **[4M]**
(b) The composition of the vapor **[3M]**
(c) The kilogram steam required for distillation one kilogram benzaldehyde **[3M]**

The vapor pressure of benzaldehyde and water at various temperatures are given below:

T, ° C	62	75	90	99.6
Benzaldehyde, mm Hg	10	20	40	60
Water, mm Hg	169.8	289.1	527.8	749.2

Or

Q.1 A mixture consisting of 60 mol% benzene and the rest toluene is subjected to single stage distillation at 101.3 kPa at a rate of 100 kmol/h so that one third of the feed mixture is vaporised. The equilibrium data for benzene –toluene system at 101.3 kPa.

T (K)	383. 8	379.6	375.5	371.8	368.4	365.7	362.7	360.2	357.8	355.6	354.4	353.3
x	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	0.95	1
y	0	0.205	0.369	0.502	0.618	0.706	0.789	0.849	0.907	0.955	0.978	1

(a) Flow rates and composition of the products **[6M]**
(b) Temperature in the separator **[4M]**
(c) The percent of the feed to be vaporized to produce a distillate containing 65 mol% benzene **[5M]**

Q.2 Benzaldehyde (MW106) contaminated with small amounts of a nonvolatile impurity is purified by steam distillation at a total pressure of 1 atm. Saturated steam at 1 atm is passed through a charge consisting of 100 kg of benzaldehyde taken in the still. Determine

a) The distillation temperature **[4M]**

b) The composition of the vapor **[3M]**

c) The steam required for distillation of 100 kilogram benzaldehyde if vaporization efficiency is 90% **[3M]**

The vapor pressure of benzaldehyde and water at various temperatures are given below:

T, ° C	62	75	90	99.6
Benzaldehyde, mm Hg	10	20	40	60
Water, mm Hg	169.8	289.1	527.8	749.2