

III B.Tech II Semester Supplementary Examinations, April/May 2005
MASS TRANSFER OPERATIONS-II
(Chemical Engineering)

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

- Explain a constant temperature V-L-E for a binary mixture with a neat schematic diagram
 - Explain the effect of changing pressure on a constant pressure V-L-E diagram for a binary mixture
 - What is the significance of relative volatility.
- Explain with figure the effect of different feed conditions in a distillation column. Write about the importance of qline
- A binary mixture of completely miscible components is to be separated in a packed distillation column operated at atmospheric pressure. The relative volatility is 1.2. The distillate product to be obtained should contain 95 mole% of the more volatile component. Compute for this case, the number of transfer units required if the column is operated at total reflux.
- Discuss about the fields of usefulness of liquid - liquid extraction
 - Explain equilateral triangular coordinates to represent ternary liquid systems.
- If 8000 kg/h of an acetic acid (C)-water (A) solution, containing 30 % acid, is to be counter currently extracted with isopropyl ether (B) to reduce the acid concentration to 2 % in the solvent free raffinate product,
 - The minimum amount of solvent which can be used and
 - The number of theoretical stages if 20,000 kg/h of solvent is used.

The equilibrium data are given below.

Water layer, wt %			Isopropyl ether layer wt%		
Wt% acetic acid 100x	Water	Isopropylether	Acetic acid 100y*	Water	Isopropylether
0.69	98.1	1.2	0.18	0.5	99.3
1.41	97.1	1.5	0.37	0.7	98.9
2.89	95.5	1.6	0.79	0.8	98.4
6.42	91.7	1.9	1.93	1.0	97.1
13.30	84.4	2.3	4.82	1.9	93.3
25.50	71.1	3.4	11.40	3.9	84.7
36.70	58.9	4.4	21.60	6.9	71.5
44.30	45.1	10.6	31.1	10.2	58.1
46.40	37.1	16.5	36.2	15.1	48.7

6. Explain Continuous-Countercurrent Decantation (CCD).
 - (a) with simple flow sheet
 - (b) flow sheet with intermediate agitation and filtration of washed solids.
7.
 - (a) Explain about the theories of adsorption
 - (b) Discuss about the nature and characteristics of adsorbents used in industry. List at least four industrial adsorbents.
 - (c) What is adsorption hysteresis?
8.
 - (a) Draw and explain the working principle involved in an Adsorber for solvent vapor at high pressures ?
 - (b) Explain the term LUB? How do you calculate?
