Roll No. | | | | | | | | | | | | |

Total No. of Pages : 02

Total No. of Questions : 09

B.Tech.(CHE) (2011 Onwards)
B.Tech.(Petroleum Refinary Engineering) (2013 Batch) (Sem.–5)

MASS TRANSFER-II

Subject Code : BTCH/BTPC-502
Paper ID : [A2084]

Time : 3 Hrs. Max. Marks : 60

INSTRUCTION TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**
4. **Assume any missing data.**

SECTION-A

Q1 Answer briefly :

a) What is q line? Give its significance.

b) What is Murphee plate efficiency?

c) What do you understand by negative and positive deviation from Roult's Law?

d) Write down the assumption made in McCabe Thiele method.

e) Give the principle of liquid-liquid extraction.

f) Give the industrial applications of adsorption.

g) What is adsorption isotherm? Give the equation for Freundlich isotherm.

h) Give the factors affecting the leaching operation.

i) Differentiate between homogeneous and heterogeneous nucleation.

j) What do you understand by flooding and priming with respect to tray tower?

SECTION-B

Q2 What is flash vaporization? Comment on the compositions of actual products to be represented on H_{xy} and xy diagrams for continuous flash vaporization.

Q3 What is leaching? Discuss the equilibrium in solid-liquid leaching process.

Q4 Explain with suitable diagram, multistage counter-current leaching.

Q5 Describe briefly any two continuous contact extractors used for liquid-liquid extraction.

Q6 Write a short note on Vacuum crystallizer.

SECTION-C

Q7 A feed containing equimolar mixture A and B at its bubble point has to be separated out at atmospheric pressure in a distillation column having ten theoretical plates including reboiler and condenser with an aim to obtain 96 mole% of A as overhead product. Assuming the average relative volatility of A over the range of temperature involved in operation as 2.6. Determine :

a) Minimum reflux ratio

b) Yield of distillate product/moles of feed on operating the column at a reflux ratio of 1.5 times the minimum.

Q8 Valuable oil was showing colour due to the presence of small amount of impurity. The impurity is to be removed by adsorption by using a suitable adsorbent. Experiments at constant temperature on decolourisation of oil yielded the equilibrium relationship as $y = 0.5x^{0.5}$ where y = gm colour removed/gm adsorbent and x = colour in oil, gm colour/1000 gm colour free oil. 100 kg oil containing 1 part of colour to 3 parts of oil is agitated with 25 kg of adsorbent. Calculate the percentage colour removed if all 25 kg of adsorbent is used in single stage.

Q9 Water has been employed in four stage crosscurrent extraction unit for extracting acetaldehyde from an acetaldehyde-toluene solution containing 10% (w/w) acetaldehyde. Calculate the amount of acetaldehyde extracted and the final concentration of exist stream, if 30 Kg of water is utilized per 100 Kg of feed each time. The equilibrium relationship is given as $y = 2.2\ x$, where y, is Kg of acetaldehyde/Kg of water and x is Kg of acetaldehyde/Kg of toluene. Note that the toluene and water are essentially insoluble.