T.E. sem-VI (CBSGS) chemical - MTO-II 29/11/16

Mass Transfer operation-II

QP CODE : 574203

[3 Hours] [Total Marks: 80]

(1) Q.1 is compulsory.
(2) Attempt any 3 from the remaining 5 questions.
(3) Use graph paper, if required .

Q.1 (a) Explain enriching section in distillation column. [05]

(b) Compare beween extraction and distillation as seperation methods. [05]

(c) Explain pervaporation. [05]

(d) Write a short note on Swanson Walker crystallizer. [05]

Q.2 (a) Explain Ponchon- savarit method for multi stage tray towers. [12]

(b) Derive Fenske's equation for minimum no. of stages at total reflux. [08]

Q.3 (a) Water – dioxane solution forms a minimum boiling azeotrope at atmospheric pressure and cannot be separated by ordinary distillation methods. Benzene forms no azeotrope with dioxane and may be used as an extraction solvent. At 25°C the equilibrium distribution of dioxane between water and benzene is as follows:

wt % in water	5.1	18.9	25.2
wt % in benzene	5.2	22.5	32

(i) Calculate benzene requirement for single stage operation. [08]

(ii) If the extraction is done in counter current fashion, what is the minimum solvent requirement in kg/hr? [06]

(b) Write a short note on any one liquid - liquid extraction equipment. [06]

Q.4 (a) 360 kg/hr of halibut liver is to be extracted in a counter current cascade with ether to recover oil. The ether which has been used partially contains 2.5 % oil. The fresh liver contains 25% oil and is to be extracted to composition 2% oil. (On solvent free basis) 250 kg of solvent is to be used.

(i) What % of oil entering with the liver is recovered in the extract? [08]

(ii) How many equilibrium stages are required? [07]

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The data are as given below:

Concentration (kg oil/kg solution)	0	0.1	0.2	0.3	0.4	0.5
Kg solution/kg exhausted liver	0.288	0.368	0.44	0.51	0.6	0.71

(b) Explain the construction and working of Bollmann extractor. [05]

Q.5. (a) Explain desired properties of adsorbents. [06]

(b) Write the industrial applications of adsorption. Describe any 4 adsorbents. [08]

(c) Write a short note on steam distillation. [06]

Q. 6. Write short notes on the following:

(a) Azeotropic distillaiton [05]

(b) Binodal solubility curve [05]

(c) Ion exchange process [05]

(d) Electrodialysis [05]