Mass Transfer Operations QP Code : 6323

[3 Hours]   (21)   [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   Write short notes on the following:

(a) Solubility curves for Crystallization   (05)

(b) Steam distillation   (05)

(c) Properties of extraction solvent.   (05)

(d) Reverse Osmosis   (05)

Q.2   (a) Describe Swenson-Walker crystallizer.   (07)

(b) 1000 kgmoles/hr ethanol-propanol mixture containing 65mole% ethanol is fed to a

distillation column. The output concentrations are x_D=0.92 & x_W=0.07. The feed is saturated

vapor. Reflux ratio = 4 and relative volatility 2.1. Find the no. of theoretical plates.   (13)

Q.3   (a) Derive Rayleigh's equation.   (06)

(b) Halibut oil is extracted from granulated livers by countercurrent extraction using ether.

The feed rate of livers is 350kg/h with 20% oil. The solvent rate is 250kg/h with 2% oil.

The residue after separation contains 1% oil on solvent free basis. Find the no. of stages.

The equilibrium data is as follows: (14)

Kg oil/kg solution	0	0.1	0.2	0.3	0.4	0.5	0.6
Kgsolution/kgresidue	0.28	0.34	0.4	0.47	0.55	0.66	0.8

Q.4   (a) Describe McCabe Thiele method of calculating no. of theoretical plates in rectification.

Explain the effect of feed conditions.   (12)

(b) A water sample contains 12ppm chlorine, to be treated with activated carbon to

reduce it to 0.5ppm. Find the minimum quantity of adsorbent/unit volume of feed. The

equilibrium distribution coefficient = c^*/x = 0.8 kgCl_2/m^{3}water/kgCl_2/kgCarbon   (08)

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Q. 5   (a) Explain Binodal curve.   (06)

      (b) Describe any 4 extraction equipments   (14)

Q.6   (a) Describe breakthrough curve   (06)

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

      (c) Compare minimum & maximum boiling azeotropes.   (06)

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