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Question Paper Code: 95902

B.E./B.Tech. DEGREE EXAMINATION, NOV 2022

Fifth Semester

Chemical Engineering

19UCH502 - MASS TRANSFER-II

(Regulation 2019)

Duration: Three hours   Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. For Air-Water system Lewis Number equals to   CO1- U

   (a) Approx 1   (b) 0   (c) 0 to 1   (d) Infinity

2. Spray tower is a _____ process.   CO1- U

   (a) Co-current   (b) Counter current

   (c) Continuous   (d) Batch

3. Which distillation is used to separate azeotropes and close boiling mixtures?   CO1- U

   (a) Extractive distillation   (b) Salt distillation

   (c) Pressure-swing distillation   (d) Reactive distillation

4. When heat is supplied to bottom of liquid stage to vaporize a portion it is called   CO1- U

   (a) Condensing   (b) Boil up   (c) Cooling   (d) Desalting

5. Packed tower with _____ packing preferable for liquid extraction.   CO1- U

   (a) Uniform   (b) Random

   (c) Complete   (d) None of the mentioned

6. When the component has a small value of K, it is supposed to have an affinity for   CO1- R

   (a)Mobile phase   (b)No phase   (c)Stationary phase   (d)Whole solution

7. The number of theoretical stages, depends on the   CO1- U

   (a) Stepping off the tray   (b) Reflux ratio   (c) Operating line   (d) Flow rates

8. When the point does liquid and solid exist at equilibrium is   CO1- U

   (a) Double point   (b)Triple point   (c)Dew point   (d) Freezing point

9. In Langmuir's model of adsorption of a gas on a solid surface the mass of gas   CO1- R
   striking a given area of surface is _____to the pressure of the gas.

   (a) Proportional   (b) Anti proportional

   (c) Independent   (d) None of the mentioned

10. Sorption" consist of   CO2- App

   (a) Attachment   (b) Detachment   (c) Diffusion   (d) Thermal Expansion

PART – B (5 x 2= 10 Marks)

11. Define scarcity   CO1- U

12. What is Inflation?   CO1- U

13. What is solvent extraction method?   CO1- U

14. What is solid-liquid extraction process?   CO1- U

15. What is the principle of adsorption?   CO1- R

PART – C (5 x 16= 80 Marks)

16. (a) An Air-NH3 mixture containing 5% NH_3 by volume is absorbed in   CO2- App   (16)
       water using a packed tower at 20(degree Celsius) and 1 atm
       pressure to recover 98% NH_3.gas flow rate is 1200
       kg/hm2.calculate (a) Minimum mass flow rate of liquid,(b) NTU
       using 1.25 times the minimum liquid flow rate.(c) Height of
       packed column KGa= 128 kg/h m2.atm. The equilibrium relation
       is a y= 1.154 x where x,y are expressed in mole fraction units.

                                    Or

    (b) Write a note on pressure drop in packed towers for absorption.   CO1- U   (16)

17. (a) Explain in detail about the design calculations by McCabe- Thiele   CO1- U   (16)
       and Ponchon-Savarit, methods.

                                    Or

    (b) Explain briefly about the steam distillation.   CO1- U   (16)

18. (a) Discuss about the Equilibrium in ternary systems. CO1- U (16)

Or

(b) Water-dioxane solution is to be separated by extraction process using benzene as solvent.at 25(degree Celsius) the equilibrium distribution of dioxane between water and benzene is as follows: CO2- App (16)

Weight % of dioxane in water   5.1   18.9   25.2

Weight % of dioxane in benzene 5.2   22.5   32.0

At these concentrations water and benzene are substantially insoluble.1000 kg of a 25% dioxane water solution is to be extracted to remove 95% of dioxane.the benzene is dioxane free.

(i)Calculate the benzene requirement for a single batch operation.

(ii)Calculate the benzene requirement for a five-stage cross-current operation with 600kg of solvent used in each stage.

19. (a) Explain about the solid-liquid extraction(leaching).. CO1- U (16)

Or

(b) Describe about the solid-liquid equilibria. CO1- U (16)

20. (a) Describe about the Adsorption equipment for batch and continuous operation. CO1- U (16)

Or

(b) Explain briefly about the industrial adsorbent. CO5- U (16)

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