

- Q.26 Explain gas desorption mass transfer operation with the help of suitable examples?
- Q.27 Discuss the concept of wet bulb temperature in brief?
- Q.28 Define the term humidity. Discuss two different ways to express humidity?
- Q.29 Describe the working of tray drier?
- Q.30 Describe the construction of spray ponds in brief?
- Q.31 What is difference between batch drier and continuous drier?
- Q.32 Explain the different factors affecting the selection of a solvent for gas absorption mass transfer operations?
- Q.33 Define and discuss drying mass transfer operation in brief?
- Q.34 Discuss construction of cooling tower in brief?
- Q.35 What is difference between free moisture and equilibrium moisture?

#### SECTION-D

**Note:** Long Answer type question. Attempt any two questions. (2x10=20)

- Q.36 Describe the classification of mass transfer operations, on the basis of direct contact of two immiscible phase, in detail with the help of one example for each type?
- Q.37 Describe the packed tower used in chemical industry in detail with the help of neat diagram?
- Q.38 Discuss the construction and working of rotary drier in detail with the help of neat diagram?

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**4th Sem / Chemn. & P&P**

**Subject : Mass Transfer I**

**Time : 3 Hrs.**

**M.M. : 100**

#### SECTION-A

**Note:** Multiple choice questions. All questions are compulsory. (10x1=10)

- Q.1 Mass transfer operations are used for which of the following purpose?
- Purification of raw materials
  - Manufacture of Products
  - Bleaching of Pulp
  - Chemical modification of material
- Q.2 Mass transfer co-efficient (k) and diffusivity (D) are related according to film theory as?
- $k \propto D$
  - $k \propto D^{1/2}$
  - $k \propto D^{3/2}$
  - $k \propto D^2$
- Q.3 What should be done for adsorbing a sparingly soluble gas in a liquid?
- Gas side coefficient be increased
  - Liquid side coefficient be increased.
  - Gas side coefficient be decreased
  - Liquid side coefficient be decreased
- Q.4 Channeling is most severe in which type of towers?
- Without packing
  - With dumped packing of regular units
  - With stacked packing
  - Randomly packed with crushed solids

- Q.5 When both the fluids flow concurrently in an absorber, the slope of the operating
- a) 1                                      b) Uncertain  
c) Positive                                d) Negative
- Q.6 Fick's law is valid for?
- a) Solids                                      b) Liquids  
c) Gases                                      d) All of the above
- Q.7 Humidification involves mass transfer between a pure liquid phase and a fixed gas which is?
- a) Soluble in the liquid    b) Insoluble in the liquid  
c) Non-Ideal in nature    d) Ideal in nature
- Q.8 Raoult's law is applicable to?
- a) Ideal solutions  
b) Real solutions  
c) Mixture of water and alcohol  
d) All of the above
- Q.9 Heat is BTU necessary to increase the temperature of 1 lb of gas and its accompanying vapour by 1°F is called?
- a) Latent heat                                b) Humid heat  
c) Specific heat                                d) Sensible heat
- Q.10 All moisture in a non-hygroscopic material is?
- a) Bound moisture                                b) Free moisture  
c) Unbound moisture                                d) Equilibrium moisture

### SECTION-B

**Note:** Objective type questions. All questions are compulsory. (10x1=10)

- Q.11 Name the phase contact category of humidification mass transfer operation?

- Q.12 Write full form of HETP?
- Q.13 Write an expression to calculate molecular diffusion in gases for steady state equimolar counter diffusion.
- Q.14 Define mass transfer coefficient?
- Q.15 Name the type of solution in which intermolecular forces of attraction and repulsion in solution remain unchanged on mixing the constituents?
- Q.16 State Henry's Law?
- Q.17 Write any two factors which affect the rate of mass transfer operations?
- Q.18 How moisture content on dry basis is expressed?
- Q.19 The liquid fills the entire space between the trays during operation of tray towers. Name the term which is used to describe this problem.
- Q.20 What is the name given to the chart which depicts variation in absolute humidity, enthalpies and humid volume versus temperature for air-water mixture?

### SECTION-C

**Note:** Short answer type questions. Attempt any twelve questions out of fifteen questions. (12x5=60)

- Q.21 Discuss any one type of mass transfer operation in brief?
- Q.22 What are uses of humidity chart?
- Q.23 Explain the diffusion under concentration gradient with the help of a suitable example?
- Q.24 Explain the molecular diffusion in the gases involving steady state equimolar counter diffusion with the help of a suitable example?
- Q.25 Discuss the characteristics of tower packing which are to be considered while its selection for particular application?