Code.No: RR310804 | RR | SET-1

III B.TECH – I SEM EXAMINATIONS, NOVEMBER - 2010
MASS TRANSFER OPERATIONS – I
(CHEMICAL ENGINEERING)

Time: 3hours **Max.Marks:80**

Answer any FIVE questions
All questions carry equal marks

- - -

1. (a) Write the assumptions made to device the equation to calculate the flux of component A through non - diffusing B.
   (b) In a given situation ammonia A is diffusing through air B which is stagnant film. The conditions of the system are at 295K and 1.01325 $\times 10^5$ N/m^2. The concentration of ammonia at one side of the film is 50mole % and that in other side is 0 mole %. The thickness of the film is 5 mm and the diffusion coefficient of ammonia in air is 19 $\times$ 10^{-6} m^2/ sec. at 273K. Estimate the quantity of ammonia diffusing on a day if the area of the stagnant film is 4 m^2. [4+12]

2. (a) Explain briefly the situations where mass transfer coefficients 'K' is used.
   (b) What are the assumptions made to derive the expression for mass transfer coefficients for the situation, where gas is differing in to falling liquid film?
   (c) Explain briefly surface stretched theory. [4+6+6]

3. (a) Explain briefly two film theory with suitable example and an explain briefly about gas phase consoled.
   (b) Differentiate cross current operation from counter current operation with suitable sketches. [8+8]

4. (a) Explain briefly tray spacing, down sports, flooding velocity for tray columns.
   (b) What you understand by the geometric similarity, Kinematic similarity and dynamic similarity.
   (c) Write short notes on volumetric mass transfer coefficients. [6+6+4]

5. A gas stream containing 4% of A (volume basis) is passed through a column to remove 98% of A by absorption in water. The absorber will operate at 30^{0}C and 1.5 atm and the gas an liquid rates are to be 20mol/hr, ft^2 and 100mol/hr, ft^2 respectively. Mass transfer coefficient and equilibrium data are as follows.
   $Y^* = 3.1x$ where y and x are mole fractions of transferring substance in the gas phase and liquid phase respectively.
   $K_x a$ = 60 mol/hr ft3 unit mole fraction
   Find total height of the column based on the liquid phase and gas phase concentrations and compare them. Do not use graph paper. [16]

6. (a) Explain the procedure for detailed estimation of cooling tower height.
   (b) Differentiate wet bulb temperature from adiabatic saturation temperature with relevant equations. [10+6]

7. (a) Explain briefly through circulation drying with relevant equations.
   (b) A commercial drier needed 6 hours to dry a moist material from a moisture content of 36% to 10% on bone dry basis. The critical and equilibrium moisture content were 17 and 5 % respectively. Determine the time needed to dry the material from a moisture content of 38% to 6% if the drying conditions remain unchanged. Make suitable assumptions to solve the problem. [8+8]

8. (a) Name different separation methods available for the separation of water acetic acid mixture
   (b) Explain briefly cooling towers
   (c) How are the drying equipments are classified? [4+6+6]

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Code.No: RR310804 | RR | SET-2

III B.TECH – I SEM EXAMINATIONS, NOVEMBER - 2010
MASS TRANSFER OPERATIONS – I
(CHEMICAL ENGINEERING)

Time: 3hours **Max.Marks:80**

Answer any FIVE questions
All questions carry equal marks

- - -

1. (a) Explain briefly two film theory with suitable example and an explain briefly about gas phase consoled.
   (b) Differentiate cross current operation from counter current operation with suitable sketches. [8+8]

2. (a) Explain briefly tray spacing, down sports, flooding velocity for tray columns.
   (b) What you understand by the geometric similarity, Kinematic similarity and dynamic similarity.
   (c) Write short notes on volumetric mass transfer coefficients. [6+6+4]

3. A gas stream containing 4% of A (volume basis) is passed through a column to remove 98% of A by absorption in water. The absorber will operate at 30^0C and 1.5 atm and the gas an liquid rates are to be 20mol/hr, ft^2 and 100mol/hr, ft^2 respectively. Mass transfer coefficient and equilibrium data are as follows.
   $Y^* = 3.1x$ where y and x are mole fractions of transferring substance in the gas phase and liquid phase respectively.
   $K_x a = 60$ mol/hr ft3 unit mole fraction
   Find total height of the column based on the liquid phase and gas phase concentrations and compare them. Do not use graph paper. [16]

4. (a) Explain the procedure for detailed estimation of cooling tower height.
   (b) Differentiate wet bulb temperature from adiabatic saturation temperature with relevant equations. [10+6]

5. (a) Explain briefly through circulation drying with relevant equations.
   (b) A commercial drier needed 6 hours to dry a moist material from a moisture content of 36% to 10% on bone dry basis. The critical and equilibrium moisture content were 17 and 5 % respectively. Determine the time needed to dry the material from a moisture content of 38% to 6% if the drying conditions remain unchanged. Make suitable assumptions to solve the problem. [8+8]

6. (a) Name different separation methods available for the separation of water acetic acid mixture
   (b) Explain briefly cooling towers
   (c) How are the drying equipments are classified? [4+6+6]

7. (a) Write the assumptions made to device the equation to calculate the flux of component A through non - diffusing B.
   (b) In a given situation ammonia A is diffusing through air B which is stagnant film. The conditions of the system are at 295K and 1.01325×10^5 N/m^2. The concentration of ammonia at one side of the film is 50mole % and that in other side is 0 mole %. The thickness of the film is 5 mm and the diffusion coefficient of ammonia in air is 19×10^{-6} m^2/ sec. at 273K. Estimate the quantity of ammonia diffusing on a day if the area of the stagnant film is 4 m^2. [4+12]

8. (a) Explain briefly the situations where mass transfer coefficients 'K' is used.
   (b) What are the assumptions made to derive the expression for mass transfer coefficients for the situation, where gas is differing in to falling liquid film?
   (c) Explain briefly surface stretched theory. [4+6+6]

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Code.No: RR310804 | RR | SET-3

III B.TECH – I SEM EXAMINATIONS, NOVEMBER - 2010
MASS TRANSFER OPERATIONS – I
(CHEMICAL ENGINEERING)

Time: 3hours **Max.Marks:80**

Answer any FIVE questions
All questions carry equal marks

- - -

1. A gas stream containing 4% of A (volume basis) is passed through a column to remove 98% of A by absorption in water. The absorber will operate at 30^0C and 1.5 atm and the gas an liquid rates are to be 20mol/hr, ft^2 and 100mol/hr, ft^2 respectively. Mass transfer coefficient and equilibrium data are as follows.
   $Y^* = 3.1x$ where y and x are mole fractions of transferring substance in the gas phase and liquid phase respectively.
   $K_x a$ = 60 mol/hr ft3 unit mole fraction
   Find total height of the column based on the liquid phase and gas phase concentrations and compare them. Do not use graph paper. [16]

2. (a) Explain the procedure for detailed estimation of cooling tower height.
   (b) Differentiate wet bulb temperature from adiabatic saturation temperature with relevant equations. [10+6]

3. (a) Explain briefly through circulation drying with relevant equations.
   (b) A commercial drier needed 6 hours to dry a moist material from a moisture content of 36% to 10% on bone dry basis. The critical and equilibrium moisture content were 17 and 5 % respectively. Determine the time needed to dry the material from a moisture content of 38% to 6% if the drying conditions remain unchanged. Make suitable assumptions to solve the problem. [8+8]

4. (a) Name different separation methods available for the separation of water acetic acid mixture
   (b) Explain briefly cooling towers
   (c) How are the drying equipments are classified? [4+6+6]

5. (a) Write the assumptions made to device the equation to calculate the flux of component A through non - diffusing B.
   (b) In a given situation ammonia A is diffusing through air B which is stagnant film. The conditions of the system are at 295K and 1.01325×10^5 N/m^2. The concentration of ammonia at one side of the film is 50mole % and that in other side is 0 mole %. The thickness of the film is 5 mm and the diffusion coefficient of ammonia in air is 19×10^{-6} m^2/ sec. at 273K. Estimate the quantity of ammonia diffusing on a day if the area of the stagnant film is 4 m^2. [4+12]

6. (a) Explain briefly the situations where mass transfer coefficients 'K' is used.
   (b) What are the assumptions made to derive the expression for mass transfer coefficients for the situation, where gas is differing in to falling liquid film?
   (c) Explain briefly surface stretched theory. [4+6+6]

7. (a) Explain briefly two film theory with suitable example and an explain briefly about gas phase consoled.
   (b) Differentiate cross current operation from counter current operation with suitable sketches. [8+8]

8. (a) Explain briefly tray spacing, down sports, flooding velocity for tray columns.
   (b) What you understand by the geometric similarity, Kinematic similarity and dynamic similarity.
   (c) Write short notes on volumetric mass transfer coefficients. [6+6+4]

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Code.No: RR310804 | RR | SET-4

III B.TECH – I SEM EXAMINATIONS, NOVEMBER - 2010
MASS TRANSFER OPERATIONS – I
(CHEMICAL ENGINEERING)

Time: 3hours **Max.Marks:80**

Answer any FIVE questions
All questions carry equal marks

- - -

1. (a) Explain briefly through circulation drying with relevant equations.
   (b) A commercial drier needed 6 hours to dry a moist material from a moisture content of 36% to 10% on bone dry basis. The critical and equilibrium moisture content were 17 and 5 % respectively. Determine the time needed to dry the material from a moisture content of 38% to 6% if the drying conditions remain unchanged. Make suitable assumptions to solve the problem. [8+8]

2. (a) Name different separation methods available for the separation of water acetic acid mixture
   (b) Explain briefly cooling towers
   (c) How are the drying equipments are classified? [4+6+6]

3. (a) Write the assumptions made to device the equation to calculate the flux of component A through non - diffusing B.
   (b) In a given situation ammonia A is diffusing through air B which is stagnant film. The conditions of the system are at 295K and 1.01325×10^5 N/m^2. The concentration of ammonia at one side of the film is 50mole % and that in other side is 0 mole %. The thickness of the film is 5 mm and the diffusion coefficient of ammonia in air is 19×10^{-6} m^2/ sec. at 273K. Estimate the quantity of ammonia diffusing on a day if the area of the stagnant film is 4 m^2. [4+12]

4. (a) Explain briefly the situations where mass transfer coefficients 'K' is used.
   (b) What are the assumptions made to derive the expression for mass transfer coefficients for the situation, where gas is differing in to falling liquid film?
   (c) Explain briefly surface stretched theory. [4+6+6]

5. (a) Explain briefly two film theory with suitable example and an explain briefly about gas phase consoled.
   (b) Differentiate cross current operation from counter current operation with suitable sketches. [8+8]

6. (a) Explain briefly tray spacing, down sports, flooding velocity for tray columns.
   (b) What you understand by the geometric similarity, Kinematic similarity and dynamic similarity.
   (c) Write short notes on volumetric mass transfer coefficients. [6+6+4]

7. A gas stream containing 4% of A (volume basis) is passed through a column to remove 98% of A by absorption in water. The absorber will operate at 30^0C and 1.5 atm and the gas an liquid rates are to be 20mol/hr, ft^2 and 100mol/hr, ft^2 respectively. Mass transfer coefficient and equilibrium data are as follows.
   $Y^* = 3.1x$ where y and x are mole fractions of transferring substance in the gas phase and liquid phase respectively.
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   Find total height of the column based on the liquid phase and gas phase concentrations and compare them. Do not use graph paper. [16]

8. (a) Explain the procedure for detailed estimation of cooling tower height.
   (b) Differentiate wet bulb temperature from adiabatic saturation temperature with relevant equations. [10+6]

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