

University of Mumbai
Examination 2020 under cluster- PCOE

Program: Chemical Engineering

Curriculum Scheme: Rev 2012

Examination: Third Year Semester V

Course Code: CHC502

Course Name: Mass Transfer Operations- I

Time: 1hour

Max. Marks: 50

Note to the students: -All Questions are compulsory and carry equal marks.

Q1.	Which among the following is the statement of the 'Fick's Law'?
Option A:	The molar flux of species relative to an observer moving with the molar average velocity is proportional to the concentration gradient of the species.
Option B:	The mass flux of species relative to an observer moving with the molar average velocity is proportional to the concentration gradient of the species
Option C:	The molar flux of species relative to an observer moving with the mass average velocity is proportional to the concentration gradient of the species.
Option D:	The molar flux of species relative to an observer moving with the mass average velocity is proportional to the concentration gradient of the species.
Q2.	For what kind of mixtures $D_{AB} = D_{BA}$ holds?
Option A:	Ideal
Option B:	Real
Option C:	For both real and ideal
Option D:	This relation is never true

Q3.	For steady state equi-molal diffusion in a stagnant film, mass transfer coefficient is the ratio of molecular diffusivity to the thickness of the _____ .
Option A:	turbulent flow layer
Option B:	convective flow layer
Option C:	eddy current layer
Option D:	stagnant layer
Q4.	Find the flux of A ($x_A = 0.2$) if Total flux is 5 mol/sq.m sec and J flux of A is 2 mol/sq.m sec.
Option A:	2
Option B:	2.5
Option C:	3
Option D:	3.5
Q5.	Find the change in concentration for a steady state equimolar counter diffusion if $D_{AB} = 6$ sq.m/sec, the change in distance is 2 m and the N flux of A is 5 mol/sq.m sec.
Option A:	0.67
Option B:	1.67
Option C:	2.67
Option D:	3.67
Q6.	Find the diffusivity of AB in sq.m/sec if N flux of A 5 mol/sq.m sec, concentration difference is 2mol/cu.m and distance is 3 m.
Option A:	2.5

Option B:	5.5
Option C:	7.5
Option D:	10.5
Q7.	Estimate the mole fraction if concentration of A is 2 mol/cu.m and the total concentration is 5mol/cu.m
Option A:	0
Option B:	0.25
Option C:	0.4
Option D:	1
Q8.	For a Steady state diffusion of A through Non- diffusing B. N flux of B equal to _____
Option A:	0
Option B:	1
Option C:	2
Option D:	Infinity
Q9.	A correlation for mass transfer at high Schmidt numbers (430 to 100,000) is
Option A:	$N_{Sh} = 0.0096 N_{Re}^{0.913} N_{Sc}^{0.346}$
Option B:	$N_{Sh} = 0.0096 N_{Nu}^{0.913} N_{Sc}^{0.346}$
Option C:	$N_{Sh} = 0.0096 N_{Pr}^{0.913} N_{Sc}^{0.346}$
Option D:	$N_{Sh} = 0.0096 N_{Gz}^{0.913} N_{Sc}^{0.346}$

Q10.	What is the correct expression for overall mass transfer coefficient based on mole fraction driving forces?
Option A:	$1/K_x = 1/K_A k_y + 1/k_x$
Option B:	$K_x = 1/K_A k_y + 1/k_x$
Option C:	$1/K_x = K_A/k_y + 1/k_x$
Option D:	$1/K_x = 1/K_A k_x + 1/k_y$
Q11.	Sherwood number is given by _____ if L is a characteristic length (m), D is mass diffusivity (m^2/s) and h is the convective mass transfer film coefficient (m/s).
Option A:	$3/2 h L/D$
Option B:	$1/2 h L/D$
Option C:	$3 h L/D$
Option D:	$h L/D$
Q12.	Mass transfer coefficient will depend on _____ for dissolution of sphere in a flowing liquid. Which of the following option is invalid?
Option A:	the velocity of the liquid
Option B:	the odor of the liquid
Option C:	viscosity of the liquid
Option D:	diffusivity of sphere into liquid
Q13.	The Concentration of the two phases in a closed system at the interphase is _____
Option A:	Changes continuously

Option B:	Never changes
Option C:	Becomes zero
Option D:	Increases till the driving force becomes zero
Q14.	Flooding in a vapor-liquid contacting equipment occurs in a tray, when the pressure drop through a tray is _____ the liquid head available in the downcomer.
Option A:	less than
Option B:	more than
Option C:	same as
Option D:	very much less
Q15.	_____ columns are used for liquid dispersion in a continuous gas phase.
Option A:	Packed
Option B:	Pulse
Option C:	Bubble cap
Option D:	Sieve plate
Q16.	In a packed bed absorption column, the channeling will be noted by the
Option A:	increase in flow rate
Option B:	sharp drop in pressure drop.
Option C:	sharp rise in pressure drop.
Option D:	No change in Pressure drop.
Q17.	In absorption column, the flooding velocity for random packing is

	_____ that for stacked/regular packing
Option A:	greater than
Option B:	smaller than
Option C:	Equal to
Option D:	Greater than or smaller than depends on type of packing
Q18.	For an absorber, both equilibrium and operating line will be straight for
Option A:	Concentrated solution and non-isothermal operation
Option B:	Dilute solution and non-isothermal operation
Option C:	Dilute solution and isothermal operation
Option D:	Concentrated solution and isothermal operation
Q19.	For absorber, high pressure drop results in
Option A:	Increased efficiency
Option B:	Decreased efficiency

Option C:	High operating cost
Option D:	Better gas liquid contact
Q20.	If the equilibrium vapour pressure is lower than pure liquid pressure then the moisture content is _____
Option A:	Bound moisture
Option B:	Unbound moisture
Option C:	Equilibrium moisture
Option D:	Critical moisture
Q21.	Convert 5 kg of moisture /kg of dry solid to wet basis
Option A:	3/6
Option B:	4/6
Option C:	5/6
Option D:	1
Q22.	When dry bulb temperature (DBT) and wet bulb temperature (WBT) are measured, greater the difference between DBT and WBT,
Option A:	greater the amount of water vapour held in the mixture
Option B:	smaller the amount of water vapour held in the mixture
Option C:	same the amount of water vapour held in the mixture
Option D:	no amount of water vapour held in the mixture

Q23.	The temperature at which the air cannot hold all the water vapour mixed in it and some vapour starts condensing is called as
Option A:	humidification temperature
Option B:	dehumidification temperature
Option C:	dew point temperature
Option D:	saturation temperature
Q24.	When the dew point temperature is equal to the air temperature then the relative humidity is
Option A:	0%
Option B:	50%
Option C:	60%
Option D:	100%
Q25.	The dew point temperature is less than the wet bulb temperature for _____
Option A:	unsaturated air
Option B:	saturated air
Option C:	both saturated and unsaturated air
Option D:	dry air