MANIPAL INSTITUTE OF TECHNOLOGY
MANIPAL
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V SEMESTER B.TECH (BIOTECHNOLOGY)
END SEMESTER EXAMINATION (MAKEUP), FEB-MAR 2022
SUBJECT: Separation Processes (BIO 3154)
REVISED CREDIT SYSTEM
PART-A

1. For efficient mass transfer, the following is most appropriate (a)Sufficient time (b)driving force **(c)**large interfacial area **(d) all of the above**
2. At equilibrium between two phases (a) chemical potentials need not be equal **(b) temperature is same** (c) both the compositions are same (d) separation of the phases is easiest
3. If x=0.4, then X is (a) 0.42 (b) 0.38 **(c) 0.66** (d) 0.56
4. If X=50, then x is (a)does not exist **(b) 0.98** (c) 0.76 (c)0.32
5. For a real single stage operation **(a)efficiency is variable** (b) at equilibrium operating line has different slope (c)operating line slope is positive (d) only one active component can do mass transfer
6. Direction of mass transfer depends on (a) flow rate of phases (b) number of active components in the phases (c) duration of mass transfer **(d) position of phase composition in the equilibrium diagram**
7. Driving force for mass transfer (a)are equal for both phases (b)depends on interfacial area **(c)departure from equilibrium** (d)strongly depends on flow rate
8. Choose the correct statement in the context of gas absorption (a)when partial pressure of solute double corresponding equilibrium mole fraction in liquid always double (b)**Henry's law is valid for dilute solutions** (c)adiabatic systems are preferred for gas absorption (d)Total pressure of the absorption column has no effect on mass transfer
9. Minimum solvent required for gas absorption (a) implies minimum number of stages required (b)permissible slope of operating line is maximum (c)can be increased by decreasing the temperature (d**) implies capital cost is maximum**
10. A gas dissolves in a solvent reacting to form chemical equilibrium A(g)+B(l)=A-B(Complex), equilibrium constant $K = \frac{[A-B]}{[A][B]}$ =constant, for such systems (a)equilibrium line is linear (b)**lower K value favours gas stripping** (c)temperature has less effect for such systems (d)gas is less volatile with lower K
11. If α=2, then choose the incorrect (a) $\overline{P_A^0}=2\overline{P_B^0}$ (b) K=1.66 for x=0.1 (c)x=0.9 and y=0.941 **(d) K=1.333 for x=0.5**
12. For steam distillation by using supreheated steam (a) Sum of vapor pressures is total pressure at the temperature (b) ratio of amount of oil to water is ratio of vapor pressures of oil to water (c) steam condensation in the vessel increases efficiency while bubbling through oil (d) **None of the above**
13. The degrees of freedom for binary VLE is (a) 1 (b) 2 (c) 3 (d) cannot be predicted
14. In a bubble point dew point equilibrium plot for a given net composition, single phase existence is always possible for (a) temperature above bubble point curve (b**) temperature**

above dew point curve (c) between bubble point and dew point curves (d) cannot be predicted

15. In a single stage condensation of vapour feed (a)slope of operating line is positive **(b)energy has to removed** (c) y<x (d) equilibrium is always attained
16. For a binary VLE (a) Raoult's law validity implies constant relative volatility (b) All positive deviations systems show maximum boiling azeotrope (c) Negative deviation from ideality requires total pressure > ideal total pressure (**d) None of the above**

17. Why does the liquid mobile phase used in HPLC need to be at high pressure?
    A. It increases the adsorption of the constituents of the mixture onto the stationary phase.
    B. It increases the solubility of the constituents of the mixture in the mobile phase.
    C. **It enables the mixture under analysis to pass through the densely packed column**.
    D. It increases the attraction between the molecules of the mixture and the solvent

18. Fronting observed in Chromatogram is due to

    A. Non linear increase of Cs with Cm (isotherm)
    B. Large sample size
    C. Cs practically independent of Cm
    D. None of the above

19. Chromatogram cannot be represented as detector output (Y axis) vs the following in X axis

    A. Time
    B. Mobile phase velocity, m/s
    C. Cumulative volume of mobile phase
    D. None of the above

20. The following is most suitable for normal phase chromatography

    A. Benzene
    B. Cyclopentane
    C. Acteonitrile
    D. DMSO (Dimethyl Sulfoxide)

21. The following is most suitable for reverse phase chromatography

    A. Cholorobenzene
    B. n-hexane
    C. Ethanol
    D. CCl4

22. Which of the following is true for Refractive Index Detector

    A. It is more sensitive than UV detector
    B. It can be used only for isocratic systems
    C. It is a non selective detector

23. Adsorption is not assisted by (a) high pressure (b) **high temperature** (c) high concentration (d) mixing

24Which among the following statement is false (a) adsorption may be monolayered or multilayered (b) **particle size of adsorbent will not affect the amount of adsorption** (c)increase of pressure increase amount of adsorption (d) increase of temperature may decrease the amount of adsorption

25. Methylene blue, from its aqueous solution is adsorbed on activated charcoal at 25 C. For this the correct statement is (a) the adsorption requires activation at 25 C (b) **the adsorption is accompanied by a decrease in enthalpy** (c) the adsorption increases with increase in temperature (d) the adsorption is irreversible

26. In a drying operation (a) higher air pressure has beneficial effect (b) **moisture regain is possible at lesser than equilibrium moisture** (c) critical moisture is same as unbound moisture (d) all the bound moisture can be removed

27. Choose the incorrect (a) at Relative Humidity =1, free moisture =unbound moisture (b) at higher temperatures equilibrium moisture content decreases (d) with decreased temperature, bound moisture value increases (d) **bound+unbound moisture>equilibrium+free moisture**

28. If the moisture content of a substance is 0.2 kg/kg on wet basis, the moisture content on dry basis is (a) 0.2 (b)0.3 (c)**0.25** (d)0.15

29. The factor that does not affect the crystallization (a) temperature (b) **pressure** (c) type of solvent (d) presence of other substances

30. During crystallization, this is the first to appear (a) Crystal (b)nuclei (c)embryo (d)**cluster**