

Instructions :- 1. All questions are compulsory

Total Marks: 50

2. Each question carry two marks

3. Log table & calculator allowed to use wherever necessary

Que. Read each question carefully and choose the appropriate alternative
a, b, c or d.

1. In case of the sum of partial pressures is the same as the observed pressure of solution.
a. real solution **b. ideal solution**
c. non-ideal solution d. dilute solution
2. The number of moles of solute dissolved in of solvent is known as molality
a. **1 kilogram** b. 1 litre
c. 1 gram d. 1 dm³
3. The temperature at which two liquids which are partially miscible become completely miscible in all proportions is known as.....
a. critical temperature b. boiling temperature
c. **consolute temperature** d. freezing temperature
4. In fractional distillation of binary solution the more volatile component is obtained in distillate and less volatile component as liquid residue with change in composition is known as.....
a. azeotropic solution b. heterogeneous mixture
c. **zeotropic solution** d. immiscible solution
5. The potential generating due to diffusion of ions across the boundary between two solutions is called.....
a. single electrode potential b. **liquid-liquid junction potential**
c. cell potential d. redox potential

6. From thermodynamic point of view, maximum electrical work done by the cell is given by.....
- decrease in Gibb's free energy change**
 - increase in Gibb's free energy change
 - increase in rotational energy
 - decrease in quantum efficiency

7. What is the emf of the following chemical cell without transference at 298K

Pt | H₂ (g, 1 atm) | HCl a = 0.1 | calomel electrode

Given $E^{\circ}_{cal} = 0.268v$, $2.303RT/nF = 0.0591$

- 0.327v**
- 0.327v
- 3.27v
- 3.27v

8. In calomel electrode pure mercury is covered by a paste of is in contact with an aqueous solution of potassium Chloride.

- Hg and KCl
- Hg and Hg₂Cl₂**
- Cd and CdCl₂
- both A and B

9. Find the correct name of the following electrochemical cell

$\bar{Pt}, H_2(g, P_{atm.}) | HCl a_1 | HCl a_2 | H_2(g, P_{atm.}), Pt^+$

- Electrolyte concentration cell without transference
- Electrode concentration cell
- Chemical cell with transference.
- Electrolyte concentration cell with transference**

10. Select the correct alternative and complete the representation of electrode concentration cell reversible to cation.

$\bar{Zn(Hg)}, a_1 | Zn^{++} | \dots +$

- Zn(Hg), a₂**
- Zn(Hg), a₁
- Zn_(s)
- Cu_(s)

11. Cell emf of an electrochemical cell depends on
- temperature of an electrolytes
 - nature of electrode
 - concentration of an electrolytes
 - all of these**
12. Compton shift depends on which of the following?
- Nature of scattering substance
 - Incident radiation
 - Angle of scattering**
 - Amplitude of frequency
13. The uncertainty principle was proposed by.....
- de Broglie
 - Schrodinger
 - Einstein
 - Heisenberg**
14. Schrodinger argued that if..... could behave like waves the equation of wave motion could be successfully applied to them.
- microparticles like electrons**
 - microparticles like molecules
 - macroparticles like atoms
 - all of these
15. As a radiator the black body emits the maximum possible thermal radiation.....
- at the maximum wavelength
 - at the minimum frequency
 - at all wave lengths**
 - at constant single wave length
16. What is the energy in joules per mole with the radiation having wave length 5000\AA ⁰
[$h = 6.624 \times 10^{-34} \text{ JS}$, $N = 6.023 \times 10^{23}$, $C = 3.0 \times 10^8 \text{ ms}^{-1}$]
- $E = 2.393 \times 10^{-5} \text{ J/M}$
 - $E = 2.393 \times 10^{-8} \text{ J/M}$
 - $E = 2.393 \times 10^{+5} \text{ J/M}$**
 - $E = 2.393 \times 10^8 \text{ J/M}$

17. The quantum yield of photochemical reaction will be higher at of light radiations absorbed.
- a. higher wave length b. lower wave length
c. lower frequency d. lower energy
18. Which is the correct sequence for radiative transitions as explained by Jablonski diagram.
- a. Absorption → fluorescence → Internal conversion
b. **Absorption → Intersystem crossing → Phosphorescence**
c. fluorescence → Phosphorescence → Internal conversion
d. all of these
19. stated as, only those radiations which are absorbed by a reacting substance are responsible in producing chemical change.
- a. **The Grotthus Drapper law** b. Lambert law
c. Beer's law d. Dalton's law
20. Which of the following is an example of Photochemical equilibrium?
- a. Decomposition of HI b. Decomposition of HBr
c. **Photodimerisation of anthracene** d. Photosynthesis
21. Wave number is expressed in the unit
- a. centimeter⁻¹ b. meter⁻¹ c. hertz d. **Both a & b**
22. The rotational energy difference between two successive energy levels in terms of wave numbers is given by equation.
- a. **$2B(J+1)\text{cm}^{-1}$** b. $BJ(J+1)\text{cm}^{-1}$
c. $2(J+1)\text{cm}^{-1}$ d. $hJ(J+1)\text{cm}^{-1}$
23. A substance when exposed to radiation of wave length $4 \times 10^{-6} \text{ m}$ gave the first stokes line at $6 \times 10^{-6} \text{ m}$. What is the Raman shift value.
- a. $8.34 \times 10^5 \text{ m}^{-1}$ b. **$0.834 \times 10^5 \text{ m}^{-1}$**
c. $8.34 \times 10^5 \text{ cm}^{-1}$ d. $8.34 \times 10^{-5} \text{ cm}^{-1}$

24. The heteronuclear diatomic molecules like [CO, NO, HCl] give vibrational spectra known as
- a. microwave active b. microwave inactive
c. infrared inactive **d. infrared active**
25. Rotational spectra information of diatomic molecules is used to evaluate
- a. moment of inertia b. isotopic masses
c. bond angles **d. all of these**

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