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Max Time : 3 hr

Class : 12th Chemistry

Max Marks : 70

Mid Term Exam

Section – A

Q.1 Multiple choice Questions:

[1 x 20 = 20]

- 1) A plant shrink when it is kept in a
a) hypotonic solution b) hypertonic solution c) Isotonic solution d) pure water
- 2) Calculate the mole percentage of CH₃OH and H₂O respectively in 60 % aqueous solution of CH₃OH.
a) 45.8 , 54.2 b) 54.2 , 45.8 c) 50 , 50 d) 60 , 40
- 3) The law which indicates the relationship between solubility of a gas in liquid and pressure is _____.
a) Lowering of V.P b) Raoult's law c) Van't Hoff law d) Henry's law
- 4) The value of van't Hoff factor for ethanoic acid in benzene is :
a) 1 b) 1.5 c) 0.5 d) 2
- 5) Which one of following is always true about the spontaneous cell reaction in a galvanic cell?
a) $E_{cell}^o > 0$, $\Delta G^o < 0$, $Q > K_c$ b) $E_{cell}^o < 0$, $\Delta G^o < 0$, $Q < K_c$
c) $E_{cell}^o > 0$, $\Delta G^o > 0$, $Q > K_c$ d) $E_{cell}^o > 0$, $\Delta G^o < 0$, $Q < K_c$
- 6) The SI unit of conductivity is :
a) S/m b) S/cm c) Sm d) Scm
- 7) The magnetic moment of $[\text{Ni}(\text{CN})_4]^{2-}$ is:
a) 1.82 B.M. b) 2.82 B.M. c) 4.42 B.M. d) 5.46 B.M.
- 8) Which of the following is affected by catalyst?
a) ΔH b) ΔG c) E_a d) ΔS
- 9) For the reaction : $\text{N}_2 + 3 \text{H}_2 \rightarrow 2 \text{NH}_3$, if $\frac{d[\text{NH}_3]}{dt} = 2 \times 10^{-4} \text{ mol L}^{-1} \text{ s}^{-1}$, the value of $-\frac{d[\text{H}_2]}{dt}$ would be
a) $3 \times 10^{-4} \text{ mol L}^{-1} \text{ s}^{-1}$ b) $4 \times 10^{-4} \text{ mol L}^{-1} \text{ s}^{-1}$ c) $6 \times 10^{-4} \text{ mol L}^{-1} \text{ s}^{-1}$ d) $1 \times 10^{-4} \text{ mol L}^{-1} \text{ s}^{-1}$
- 10) Which of these does not influence the rate of reaction?
a) Nature of the reactants b) Concentration of the reactants
c) Temperature of the reaction d) Molecularity of the reaction
- 11) The existence of two different coloured complexes with the composition $[\text{Co}(\text{CH}_3)_4 \text{Cl}_2]^+$ is due to :
a) Ionization isomerism b) Linkage isomerism c) Geometrical isomerism d) Coordination isomerism
- 12) Which has the least freezing point?
a) 1 % sucrose b) 1 % NaCl c) 1 % CaCl₂ d) 1 % Glucose
- 13) In the lead-acid battery during charging , the cathode reaction is :
a) Formation of PbO₂ b) Formation of PbSO₄
c) Reduction of Pb²⁺ to Pb d) Decomposition of Pb at the anode
- 14) On addition of small amount of KMnO₄ to concentrated H₂SO₄, a green oily compound is obtained which is highly explosive in nature. Identify the compound from the following :
a) Mn₂O₇ b) MnO₂ c) MnSO₄ d) Mn₂O₃
- 15) KMnO₄ acts as an oxidizing agent in acidic medium. The number of moles of KMnO₄ that will be needed to react with one mole of sulphide ions in acidic solution is :
a) 2/5 b) 3/5 c) 4/5 d) 1/5

Assertion-Reason Based MCQs

DIRECTIONS : In each of the following questions, a statement of Assertion (A) is followed by a statement of Reason (R) is given . Choose the correct answer out of the following choices :

- a) Both assertion and reason are true, and reason is correct explanation of the assertion.
 - b) Both assertion and reason are true, but reason is not the correct explanation of the assertion.
 - c) Assertion is true, but reason is false.
 - d) Assertion is false, but reason is true
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- 16) **Assertion:** People taking a lot of salty food experience the puffiness or swelling, called edema
Reason: There is water retention in tissue cells and intercellular spaces because of osmosis.
 - 17) **Assertion:** Conductivity of all electrolytes decreases on dilution.
Reason: On dilution number of ions per unit volume decreases

- 18) **Assertion:** The boiling point of pure solvent is always higher than the boiling point of solution.
Reason: The vapour pressure of the solvent decreases in the presence of non-volatile solute.
- 19) **Assertion:** Mercury cell does not give steady potential.
Reason: In the cell reaction, ions are not involved in solution.
- 20) **Assertion:** If more volatile liquid is added to another liquid, vapour pressure of solution will be greater than that of pure solvent.
Reason: Vapour pressure of solution is entirely due to solvent molecules

Section – B

[2 X 7 = 14]

- Q.2 Define Kohlrausch law.
 Q.3 The Molarity of 900 g of water is :
 Q.4 Write application of Henry's law.
 Q.5 Define solution.
 Q.6 Define Mole fraction and Mass percentage.
 Q.7 If 20 cc of 1 M CaCl_2 and 60 cc of 0.2 M CaCl_2 are mixed, what will be the molarity of the final solution?
 Q.8 Define ligands.

Or

Define Ebullioscopic constant.

Section – C

[3 X 7 = 21]

- Q.9 Define Molar and Equivalent conductivity.
 Q.10 Calculate the equilibrium constant for the reaction at 298 K

$$4 \text{Br}^- + \text{O}_2 + 4 \text{H}^+ \longrightarrow 2 \text{Br}_2 + 2 \text{H}_2\text{O} \quad \text{Given that : } E_{\text{cell}}^{\circ} = 0.16 \text{ V}$$

 Q.11 Differentiate between double salts and coordination compounds.
 Q.12 Explain Werner's theory with example.

Or

The molar conductivity of acetic acid at infinite dilution is $387 \text{ S cm}^2 \text{ mol}^{-1}$. At the same temperature, but at a concentration of 1 mole in 1000 litres, it is $55 \text{ S cm}^2 \text{ mol}^{-1}$. What is the % age dissociation of 0.001 M acetic acid

- Q.13 For the equilibrium, $2 \text{H}_2 (\text{g}) + \text{O}_2 (\text{g}) \rightleftharpoons 2 \text{H}_2\text{O} (\text{l})$ at 25°C , ΔG° is -474.78 KJ/mol . Calculate $\log K$ for it.
 Q.14 Find the two-third life ($t_{2/3}$) of a first order reaction in which $k = 5.48 \times 10^{-14} \text{ s}^{-1}$.
 Q.15 Calculate the emf of the cell containing chromium and cadmium electrodes .
 [Given : $E_{\text{Cr}^{3+}/\text{Cr}}^{\circ} = -0.74 \text{ volt}$, $E_{\text{Cd}^{2+}/\text{Cd}}^{\circ} = -0.40 \text{ volt}$].

Section – D

[5 X 3 = 15]

- Q.16 (a) The activation energy of a reaction is 94.14 kJ/mol and the value of rate constant at 313 K is $1.8 \times 10^{-5} \text{ sec}^{-1}$. Calculate the frequency factor A .
 (b) The rate constant of a reaction at 700 K and 760 K are $0.011 \text{ M}^{-1} \text{ s}^{-1}$ and $0.105 \text{ M}^{-1} \text{ s}^{-1}$ respectively. Calculate the values of Arrhenius parameters

Or

- (a) Calculate the freezing point of a solution containing 0.5 g KCl (Molar mass = 74.5 g/mol) dissolved in 100 g water , assuming KCl to be 92% ionized. [K_f for water = 1.86 K kg/mol].
 (b) A 0.1539 molal aqueous solution of cane sugar (molar mass 342) has a freezing point of 271 K while the freezing point of pure water is 273.15 K . What will be the freezing point of an aqueous solution containing 5 g of glucose per 100 g of solution?

- Q.17 Name the following coordination compounds using I.U.P.A.C. system :

- a) $[\text{Cr}(\text{PPh}_3)(\text{CO})_5]$ b) $[\text{CoCl}(\text{NO}_2)(\text{en})_2]^+$ c) $[\text{PtCl}(\text{NH}_2\text{CH}_3)(\text{NH}_3)_2] \text{Cl}$
 d) $[\text{Co}(\text{NH}_3)_3(\text{NO}_2)_3]$ e) $[\text{Ni}(\text{dmg})_2]$

- Q.18 Write down the formulae of the following co-ordination compounds :

- a) potassium hexacyanoferrate (III) b) bis (acetylacetonato) oxovanadium (IV)
 c) dichlorotetraamminecobalt (III) ion d) potassium pentacyanonitrosylcobaltate (III)
 e) chloridobis (ethylene diamine) nitrocobalt (III) ion

