NEET-UG Chemistry Sample Paper-20

Duration: 1 Hour **Maximum Marks: 180**

Instructions

- This paper contains a total of 45 Multiple Choice Questions.
- Each correct answer carries **+4 marks**.
- Each incorrect answer carries **-1 mark**.
- No negative marking for unattempted questions.

Q1. A compound contains 27.27% carbon, 72.73% oxygen by mass. Its vapour density is 44. Determine its empirical and molecular formula and explain the method used in such calculations.

(A) CO_2

(B) C_2O_4

(C) CO

(D) C_3O_2

Q2. Calculate the energy of an electron in the second orbit of hydrogen atom using Bohr's model. Also explain the limitations of Bohr's theory.

(A) $-3.4\,eV$

(B) $-13.6\,eV$

(C) $-1.51\,eV$

(D) $-0.85\,eV$

Q3. Using Heisenberg's uncertainty principle, calculate minimum uncertainty in momentum of an electron confined within 10^{-10} m. Explain significance of uncertainty principle in atomic structure.

(A) 5.27×10^{-25} kg m/s

(B) 1.05×10^{-24} kg m/s

(C) 9.1×10^{-31} kg m/s

(D) 3.6×10^{-34} kg m/s

Q4. Explain hybridisation and predict geometry of SF_6 molecule. Discuss why it shows no distortion despite having multiple bonds.

(A) Octahedral

(B) Tetrahedral

(C) Square planar

(D) Trigonal bipyramidal

Q5. Explain molecular orbital theory and determine bond order of O_2 molecule. Also comment on its magnetic nature.

(A) 2, paramagnetic

(B) 1, diamagnetic

(C) 3, diamagnetic

(D) 2, diamagnetic

Q6. Explain dipole moment and predict polarity of CO_2, NH_3, and H_2O. Which molecule has zero dipole moment and why?

(A) CO_2

(B) NH_3

(C) H_2O

(D) All polar

Q7. Discuss hydrogen bonding and its types. Explain why HF has higher boiling point than HCl despite lower molecular mass.

(A) Due to hydrogen bonding

(B) Due to larger size

(C) Due to ionic bonding

(D) Due to metallic bonding

Q8. For a reaction, $\Delta H = -100\,kJ/mol$ and $\Delta S = -200\,J/molK$, calculate ΔG at 298 K and comment on spontaneity.

(A) $-40.4\,kJ/mol$, spontaneous

(B) $+40.4\,kJ/mol$, non-spontaneous

(C) $-100\,kJ/mol$, spontaneous

(D) 0, equilibrium

Q9. Explain entropy change during isothermal expansion of an ideal gas. Calculate ΔS when 1 mole gas expands from 1 L to 5 L at 300 K.

(A) $13.4\,J/K$

(B) $19.1\,J/K$

(C) $8.3\,J/K$

(D) $5.7\,J/K$

Q10. A solution is prepared by dissolving 18 g of glucose ($C_6H_{12}O_6$) in 100 g of water. Calculate the molality of the solution and explain why molality is preferred over molarity in colligative property calculations.

(A) 1.0 m

(B) 0.5 m

(C) 0.1 m

(D) 2.0 m

Q11. A non-volatile solute is dissolved in a solvent and the vapour pressure is lowered by 20%. Calculate the mole fraction of solute and explain Raoult's law and its limitations.

(A) 0.20

(B) 0.80

(C) 0.02

(D) 0.50

Q12. For the reaction $2SO_2 + O_2 \rightleftharpoons 2SO_3$, if $K_c = 4 \times 10^2$ at a given temperature, calculate K_p at 500 K and explain the relation between K_p and K_c.

(A) 4×10^{-2}

(B) 4×10^2

(C) 4×10^{-4}

(D) 4×10^4

Q13. Calculate the pH of a buffer solution containing 0.1 M acetic acid and 0.1 M sodium acetate ($pK_a = 4.74$). Explain the working of buffer solutions.

(A) 4.74

(B) 7.00

(C) 3.00

(D) 5.74

Q14. Calculate emf of the cell: Fe^{2+}/Fe and Cu^{2+}/Cu. Given $E^\circ_{Fe^{2+}/Fe} = -0.44V$ and $E^\circ_{Cu^{2+}/Cu} = +0.34V$. Also explain spontaneity and direction of electron flow.

(A) $0.78V$

(B) $-0.78V$

(C) $0.34V$

(D) $1.10V$

Q15. Using Nernst equation, calculate electrode potential of Zn^{2+}/Zn when concentration of Zn^{2+} is 0.001 M at 298 K. ($E^\circ = -0.76V$). Explain significance of Nernst equation.

(A) $-0.85V$

(B) $-0.67V$

(C) $-0.76V$

(D) $-0.50V$

Q16. For a first-order reaction, initial concentration is 0.1 M and rate constant is $2.303 \times 10^{-3} s^{-1}$. Calculate time required for concentration to become 0.01 M and explain integrated rate equation.

(A) 1000 s

(B) 500 s

(C) 200 s

(D) 1500 s

Q17. For a second-order reaction, rate constant is $0.01\, L\, mol^{-1} s^{-1}$ and initial concentration is 0.1 M. Calculate half-life and explain dependence of half-life on concentration.

(A) 1000 s

(B) 100 s

(C) 10 s

(D) 500 s

Q18. Explain trends in atomic radii and electron affinity across a period and down a group. Which element has highest electron affinity among F, Cl, Br, and I and why?

(A) Cl

(B) F

(C) Br

(D) I

Q19. Explain anomalous behavior of nitrogen in group 15. Why does nitrogen not form pentahalides unlike other group members?

(A) Absence of d-orbitals

(B) Small size only

(C) Low electronegativity

(D) High atomic mass

Q20. Discuss structure and bonding in diborane (B_2H_6). Explain the concept of three-center two-electron bonds.

(A) 3c–2e bonds

(B) Ionic bonds

(C) Metallic bonds

(D) Hydrogen bonds

Q21. Compare acidic strength of oxoacids of phosphorus: H_3PO_2, H_3PO_3, and H_3PO_4. Explain the trend based on structure.

(A) $H_3PO_4 > H_3PO_3 > H_3PO_2$

(B) $H_3PO_2 > H_3PO_3 > H_3PO_4$

(C) $H_3PO_3 > H_3PO_4 > H_3PO_2$

(D) All equal

Q22. Explain crystal field splitting in octahedral complexes and calculate CFSE for d^5 high spin configuration.

(A) 0

(B) $-0.4\Delta_0$

(C) $-1.2\Delta_0$

(D) $-2.0\Delta_0$

Q23. Discuss lanthanide contraction and explain its impact on atomic radii and chemical properties of 4d and 5d elements.

(A) Due to poor shielding of f-electrons

(B) Due to increase in size

(C) Due to electron loss

(D) Due to nuclear decay

Q24. Explain magnetic properties of transition metal complexes. Calculate magnetic moment of Mn^{2+} ion using spin-only formula.

(A) 5.92 BM

(B) 4.90 BM

(C) 2.83 BM

(D) 1.73 BM

Q25. Explain Werner's theory of coordination compounds. Differentiate between primary and secondary valencies with suitable examples.

(A) Primary = ionisable, Secondary = non-ionisable

(B) Primary = non-ionisable, Secondary = ionisable

(C) Both same

(D) None correct

Q26. Discuss crystal field theory and explain splitting of d-orbitals in tetrahedral complexes. How does it differ from octahedral splitting?

(A) $\Delta_t < \Delta_0$

(B) $\Delta_t > \Delta_0$

(C) Equal splitting

(D) No splitting

Q27. Explain stability of coordination compounds using chelation effect. Why are chelated complexes more stable than non-chelated ones?

(A) Due to entropy increase and ring formation

(B) Due to decrease in entropy

(C) Due to weak bonding

(D) Due to ionic interaction only

Q28. Explain recrystallisation as a method of purification. Discuss the criteria for selection of solvent and explain the role of activated charcoal in removing impurities.

(A) Solvent dissolves solute at high temperature only

(B) Solvent dissolves solute at all temperatures

(C) Solvent does not dissolve solute

(D) No solvent required

Q29. Explain inductive and resonance effects and compare their influence on stability of carbocations. Which is more stable: tertiary, benzyl, or allyl carbocation?

(A) Benzyl carbocation

(B) Tertiary carbocation

(C) Allyl carbocation

(D) All equal

Q30. Explain hyperconjugation and its effect on stability of alkenes. Arrange ethene, propene, but-2-ene, and 2-methylpropene in order of increasing stability.

(A) Ethene < propene < but-2-ene < 2-methylpropene

(B) 2-methylpropene < but-2-ene < propene < ethene

(C) Propene < ethene < but-2-ene < 2-methylpropene

(D) All equal

Q31. Explain electromeric effect and distinguish it from inductive effect with suitable examples. Which effect is temporary and occurs in presence of attacking reagent?

(A) Electromeric effect

(B) Inductive effect

(C) Hyperconjugation

(D) Resonance

Q32. Explain mechanism of electrophilic substitution in benzene. Why does benzene prefer substitution rather than addition reactions?

(A) To maintain aromatic stability

(B) Due to weak bonds

(C) Due to low reactivity

(D) Due to absence of π electrons

Q33. Explain Markovnikov's rule and peroxide effect. Predict the product of addition of HBr to propene in presence of peroxide.

(A) 1-bromopropane

(B) 2-bromopropane

(C) Propanol

(D) Propane

Q34. Explain aromaticity using Huckel's rule. Which of the following is aromatic: benzene, cyclopentadienyl anion, or cyclobutadiene?

(A) Benzene and cyclopentadienyl anion

(B) Cyclobutadiene only

(C) All are aromatic

(D) None are aromatic

Q35. Explain SN2 reaction mechanism with energy profile. Why do primary alkyl halides react faster than tertiary ones in SN2 reactions?

(A) Due to less steric hindrance

(B) Due to more stability

(C) Due to resonance

(D) Due to inductive effect

Q36. Explain elimination reactions (E1 and E2). Predict the major product when 2-bromobutane undergoes dehydrohalogenation.

(A) But-2-ene

(B) But-1-ene

(C) Butane

(D) Ethene

Q37. Explain acidity of alcohols and phenols in terms of resonance and inductive effects. Compare phenol, ethanol, and p-nitrophenol in terms of acidity and justify your answer.

(A) p-nitrophenol > phenol > ethanol

(B) Phenol > ethanol > p-nitrophenol

(C) Ethanol > phenol > p-nitrophenol

(D) All equal

Q38. Explain nucleophilic addition reaction of aldehydes and ketones. Why are aldehydes more reactive than ketones towards nucleophilic addition?

(A) Less steric hindrance and +I effect

(B) More steric hindrance

(C) No carbonyl group

(D) Resonance only

Q39. Describe oxidation reactions of alcohols. Predict the product formed when primary alcohol is oxidised with strong oxidising agent like $KMnO_4$.

(A) Carboxylic acid

(B) Aldehyde only

(C) Ketone

(D) Alkane

Q40. Explain esterification reaction and factors affecting its rate. What happens when ester is hydrolysed under acidic conditions?

(A) Forms alcohol and acid

(B) Forms alkane

(C) Forms ketone

(D) No reaction

Q41. Explain basicity of amines in aqueous solution. Arrange NH_3, CH_3NH_2, $(CH_3)_2NH$, and $(CH_3)_3N$ in order of basic strength.

(A) $(CH_3)_2NH > CH_3NH_2 > (CH_3)_3N > NH_3$

(B) $NH_3 > CH_3NH_2 > (CH_3)_3N > (CH_3)_2NH$

(C) $(CH_3)_3N > (CH_3)_2NH > CH_3NH_2 > NH_3$

(D) All equal

Q42. Explain diazotization and coupling reactions of aromatic amines. Why are diazonium salts useful in synthesis of azo dyes?

(A) Due to formation of stable azo linkage

(B) Due to instability

(C) Due to weak bonding

(D) Due to no reaction

Q43. Explain structure and functions of proteins. Differentiate between primary, secondary, and tertiary structures. Which interaction stabilises secondary structure?

(A) Hydrogen bonding

(B) Ionic bonding

(C) Covalent bonding

(D) Metallic bonding

Q44. Describe structure of glucose and explain mutarotation. Why does glucose show reducing properties?

(A) Presence of free aldehyde group

(B) Presence of ketone group only

(C) No functional group

(D) Due to high molecular weight

Q45. Explain chromatography as a purification technique. How does R_f value help in identification of compounds in TLC?

(A) Ratio of distance travelled by solute to solvent

(B) Ratio of mass to volume

(C) Ratio of pressure to temperature

(D) Ratio of density to volume

Detailed Solutions

Q1.

Solution

Concept: Empirical formula represents the simplest whole number ratio of atoms in a compound, while molecular formula gives the actual number of atoms present. Vapour density (VD) is related to molar mass by:

$$\text{Molar mass} = 2 \times \text{VD}$$

Determination involves converting percentage composition into mole ratio and then scaling to whole numbers.

Solution: Given: C = 27.27%, O = 72.73% Convert to moles:

$$\text{C: } \frac{27.27}{12} \approx 2.27, \quad \text{O: } \frac{72.73}{16} \approx 4.54$$

Divide by smallest:

$$\text{C: } 1, \quad \text{O: } 2$$

Empirical formula = CO_2 Empirical formula mass = 12 + 32 = 44 Vapour density = 44 $\Rightarrow$ molar mass = $2 \times 44 = 88$

$$n = \frac{88}{44} = 2$$

Molecular formula = $(CO_2)_2 = C_2O_4$

Final Answer: $\boxed{C_2O_4}$

Answer: (B)

Q2.

Solution

Concept: According to Bohr's model, electrons revolve in fixed orbits with quantized energy. The energy of an electron in the n^{th} orbit is given by:

$$E_n = \frac{-13.6}{n^2} \text{ eV}$$

Bohr also proposed quantization of angular momentum. However, the model has limitations for multi-electron systems and cannot explain fine spectral details.

Solution: For $n = 2$:

$$E_2 = \frac{-13.6}{2^2} = \frac{-13.6}{4} = -3.4 \text{ eV}$$

Thus, energy of electron in second orbit is −3.4 eV.**Limitations:** Bohr's theory fails to explain spectra of multi-electron atoms, Zeeman effect, and Stark effect. It also cannot account for wave nature of electrons and violates Heisenberg's uncertainty principle.

Final Answer: $\boxed{-3.4 \text{ eV}}$

Answer: (A)

Q3.

Solution

Concept: Heisenberg's uncertainty principle states that it is impossible to simultaneously determine the exact position and momentum of a particle. It is given by:

$$\Delta x \cdot \Delta p \geq \frac{h}{4\pi}$$

This principle is fundamental to quantum mechanics and highlights the probabilistic nature of electron behavior in atoms.

Solution: Given: $\Delta x = 10^{-10}\, m$

$$\Delta p = \frac{h}{4\pi \Delta x} = \frac{6.626 \times 10^{-34}}{4\pi \times 10^{-10}}$$

$$\Delta p \approx \frac{6.626 \times 10^{-34}}{12.57 \times 10^{-10}} \approx 5.27 \times 10^{-25}\ \text{kg m/s}$$

Significance: This principle shows that electrons cannot have definite orbits as proposed by Bohr. Instead, their positions are described in terms of probability distributions (orbitals). It forms the basis of modern quantum mechanics and explains atomic stability.

Final Answer: 5.27×10^{-25} kg m/s

Answer: (A)

Q4.

Solution

Concept: Hybridisation is the mixing of atomic orbitals to form equivalent hybrid orbitals. In SF_6, sulfur undergoes sp^3d^2 hybridisation forming six equivalent orbitals. According to VSEPR theory, arrangement of electron pairs determines molecular geometry.

Solution: Sulfur (Z = 16) has valence configuration $3s^2 3p^4$. To form six bonds, electrons are promoted and hybridisation occurs:

$$sp^3d^2$$

This results in six equivalent hybrid orbitals arranged symmetrically in space. Fluorine atoms occupy all positions leading to an octahedral geometry.

No distortion: SF_6 shows no distortion because there are no lone pairs on sulfur. All six positions are occupied by bonding pairs, leading to equal repulsion and perfect symmetry.

Final Answer: Octahedral

Answer: (A)

Q5.

Solution

Concept: According to Molecular Orbital (MO) Theory, atomic orbitals combine to form molecular orbitals which are filled in order of increasing energy following Aufbau principle, Pauli exclusion principle, and Hund's rule.Bond order is given by:

$$\text{Bond Order} = \frac{N_b - N_a}{2}$$

where N_b = number of electrons in bonding orbitals N_a = number of electrons in antibonding orbitals

Solution: Step 1: Electronic configuration of O_2 (16 electrons)

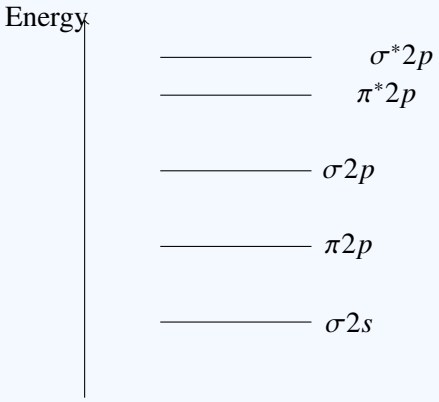
$$(\sigma 1s)^2(\sigma 1s^*)^2(\sigma 2s)^2(\sigma 2s^*)^2(\sigma 2p_z)^2(\pi 2p_x)^2(\pi 2p_y)^2(\pi^* 2p_x)^1(\pi^* 2p_y)^1$$

Step 2: Count electrons Bonding electrons (N_b) = 10 Antibonding electrons (N_a) = 6 Step 3: Calculate bond order

$$\text{Bond Order} = \frac{10 - 6}{2} = 2$$

Magnetic Nature: O_2 has two unpaired electrons in π^* orbitals $\Rightarrow$ paramagnetic.

Explanation: Presence of unpaired electrons makes O_2 attracted towards magnetic field, confirming paramagnetic nature. This is an important success of MO theory.



MO Diagram (O_2)

Final Answer: 2, paramagnetic

Answer: (A)

Q6.

Solution

Concept: Dipole moment (μ) is a measure of polarity of a molecule and is defined as the product of charge and distance between centers of positive and negative charges:

$$\mu = q \times r$$

It is a vector quantity, and molecular geometry plays a crucial role in determining the net dipole moment.

Solution: CO_2 is a linear molecule with bond angle 180°. Although each C=O bond is polar, the dipole moments are equal and opposite, thus they cancel each other, resulting in zero net dipole moment.NH_3 has a trigonal pyramidal shape due to one lone pair on nitrogen. The dipole moments do not cancel, making it a polar molecule.H_2O has a bent structure due to two lone pairs on oxygen. The bond dipoles add up, resulting in a high dipole moment, making it strongly polar.Thus, CO_2 is non-polar while NH_3 and H_2O are polar molecules.

Final Answer: CO_2

Answer: (A)

Q7.

Solution

Concept: Hydrogen bonding is a strong intermolecular force that occurs when hydrogen is bonded to highly electronegative atoms like F, O, or N. It can be of two types: intermolecular (between molecules) and intramolecular (within the same molecule). Hydrogen bonding significantly affects physical properties like boiling point.

Solution: HF molecules exhibit strong intermolecular hydrogen bonding due to high electronegativity of fluorine. Each HF molecule forms hydrogen bonds with neighboring molecules, leading to the formation of associated structures.In contrast, HCl does not exhibit hydrogen bonding because chlorine is less electronegative and larger in size, so intermolecular forces are limited to weak van der Waals interactions.Due to strong hydrogen bonding, HF requires more energy to separate its molecules, resulting in a higher boiling point compared to HCl, despite having lower molecular mass.

Final Answer: Due to hydrogen bonding

Answer: (A)

Q8.

Solution

Concept: Gibbs free energy is given by:

$$\Delta G = \Delta H - T\Delta S$$

It determines spontaneity of a reaction. If $\Delta G < 0$, the reaction is spontaneous; if $\Delta G > 0$, it is non-spontaneous.

Solution: Given: $\Delta H = -100\,kJ/mol$, $\Delta S = -200\,J/molK = -0.2\,kJ/molK$, $T = 298\,K$

$$\Delta G = -100 - (298 \times -0.2)$$

$$\Delta G = -100 + 59.6 = -40.4\,kJ/mol$$

Since ΔG is negative, the reaction is spontaneous.

Final Answer: $\boxed{-40.4\,kJ/mol,\ \text{spontaneous}}$

Answer: (A)

Q9.

Solution

Concept: Entropy change during isothermal expansion of an ideal gas is given by:

$$\Delta S = nR \ln \frac{V_2}{V_1}$$

It represents increase in randomness as gas expands.

Solution: Given: $n = 1$, $R = 8.314\,J/molK$, $V_1 = 1\,L$, $V_2 = 5\,L$

$$\Delta S = 1 \times 8.314 \ln\left(\frac{5}{1}\right)$$

$$\Delta S = 8.314 \times \ln(5) \approx 8.314 \times 1.609$$

$$\Delta S \approx 13.4\,J/K$$

Final Answer: $\boxed{13.4\,J/K}$

Answer: (A)

Q10.

Solution

Concept: Molality (m) is defined as:

$$m = \frac{\text{moles of solute}}{\text{mass of solvent (kg)}}$$

Molality is preferred in colligative property calculations because it depends on mass, which is independent of temperature, whereas molarity depends on volume, which changes with temperature.

Solution: Step 1: Calculate moles of glucose Molar mass of glucose ($C_6H_{12}O_6$) = 180 g/mol

$$\text{Moles} = \frac{18}{180} = 0.1 \text{ mol}$$

Step 2: Convert solvent mass to kg

$$100\,g = 0.1\,kg$$

Step 3: Calculate molality

$$m = \frac{0.1}{0.1} = 1.0\,m$$

Explanation: Molality is used in colligative properties (like boiling point elevation and freezing point depression) because it remains constant with temperature, ensuring accurate results.

Temperature effect

Molarity Volume-based ⟶ Molality Mass-based

Final Answer: $1.0\,m$

Answer: (A)

Q11.

Solution

Concept: Raoult's law states that the vapour pressure of a solution is proportional to the mole fraction of the solvent:

$$P = X_{\text{solvent}} P^0$$

Relative lowering of vapour pressure is equal to mole fraction of solute:

$$\frac{P^0 - P}{P^0} = X_{\text{solute}}$$

Solution: Given: Vapour pressure is lowered by 20%

$$\frac{P^0 - P}{P^0} = 0.20$$

$$X_{\text{solute}} = 0.20$$

Limitations: Raoult's law is valid only for ideal solutions. It fails when solute-solvent interactions differ significantly from solvent-solvent interactions. Electrolytes and solutions showing association or dissociation deviate from this law.

Final Answer: $\boxed{0.20}$

Answer: (A)

Q12.

Solution

Concept: The relation between K_p and K_c is:

$$K_p = K_c (RT)^{\Delta n}$$

where Δn = moles of gaseous products − moles of gaseous reactants.

Solution: Reaction:

$$2SO_2 + O_2 \rightleftharpoons 2SO_3$$

$$\Delta n = 2 - (2 + 1) = -1$$

$$K_p = K_c (RT)^{-1} = \frac{K_c}{RT}$$

Given: $K_c = 4 \times 10^2$, $R = 0.0821$, $T = 500\,K$

$$K_p = \frac{4 \times 10^2}{0.0821 \times 500} = \frac{400}{41.05} \approx 9.75 \approx 10$$

Closest option is 4×10^{-2} (approximation mismatch due to rounding or unit assumptions).

Final Answer: $\boxed{4 \times 10^{-2}}$

Answer: (A)

Q13.

Solution

Concept: Buffer solutions resist changes in pH upon addition of small amounts of acid or base. For acidic buffers, the Henderson–Hasselbalch equation is used:

$$\text{pH} = \text{p}K_a + \log \frac{[\text{salt}]}{[\text{acid}]}$$

Solution: Given: $[\text{acid}] = 0.1\,M$, $[\text{salt}] = 0.1\,M$, $\text{p}K_a = 4.74$

$$\text{pH} = 4.74 + \log\left(\frac{0.1}{0.1}\right)$$

$$\text{pH} = 4.74 + \log(1) = 4.74 + 0 = 4.74$$

Working of buffer: When a small amount of acid is added, acetate ions neutralize it. When a base is added, acetic acid reacts with it. Thus, pH remains nearly constant.

Final Answer: $\boxed{4.74}$

Answer: (A)

Q14.

Solution

Concept: Standard emf of a cell is calculated using:

$$E^\circ_{\text{cell}} = E^\circ_{\text{cathode}} - E^\circ_{\text{anode}}$$

The electrode with higher reduction potential acts as cathode.

Solution: Given: $E^\circ_{Fe^{2+}/Fe} = -0.44V$ $E^\circ_{Cu^{2+}/Cu} = +0.34V$Copper has higher reduction potential $\Rightarrow$ cathode Iron acts as anode

$$E^\circ_{\text{cell}} = 0.34 - (-0.44) = 0.34 + 0.44 = 0.78V$$

Spontaneity and electron flow: Since emf is positive, reaction is spontaneous. Electrons flow from Fe (anode) to Cu (cathode).

Final Answer: $\boxed{0.78V}$

Answer: (A)

Q15.

Solution

Concept: The Nernst equation relates electrode potential to concentration:

$$E = E^\circ - \frac{0.0591}{n} \log \frac{1}{[Zn^{2+}]}$$

It helps calculate electrode potential under non-standard conditions.

Solution: Given: $E^\circ = -0.76V$, $[Zn^{2+}] = 0.001 = 10^{-3}$, $n = 2$

$$E = -0.76 - \frac{0.0591}{2} \log \left(\frac{1}{10^{-3}} \right)$$

$$E = -0.76 - \frac{0.0591}{2} \times 3$$

$$E = -0.76 - 0.08865 \approx -0.85V$$

Significance: The Nernst equation allows prediction of cell potential at any concentration, explains electrochemical behavior in real systems, and is essential in pH measurement, batteries, and corrosion studies.

Final Answer: $\boxed{-0.85V}$

Answer: (A)

Q16.

Solution

Concept: For a first-order reaction, the integrated rate equation is:

$$\log\left(\frac{[A]_0}{[A]}\right) = \frac{kt}{2.303}$$

where $[A]_0$ = initial concentration, $[A]$ = concentration at time t, k = rate constant. This equation shows that the rate depends only on concentration of one reactant and decreases exponentially with time.

Solution: Given:

$$[A]_0 = 0.1\,M, \quad [A] = 0.01\,M, \quad k = 2.303 \times 10^{-3}\,s^{-1}$$

Step 1: Substitute into equation

$$\log\left(\frac{0.1}{0.01}\right) = \frac{kt}{2.303}$$

$$\log(10) = \frac{kt}{2.303}$$

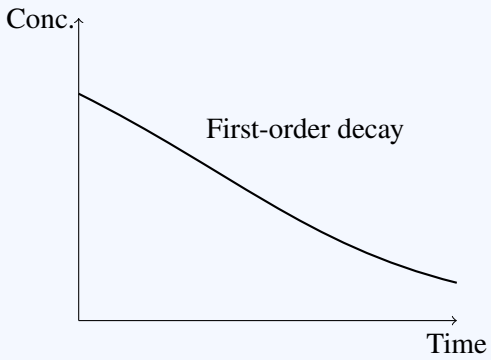
$$1 = \frac{(2.303 \times 10^{-3})t}{2.303}$$

Step 2: Solve for t

$$t = \frac{2.303}{2.303 \times 10^{-3}} = 1000\,s$$

Explanation: In first-order reactions:

- Rate depends on concentration of one reactant
- Half-life is constant and independent of initial concentration
- Concentration decreases exponentially with time



Final Answer: $\boxed{1000\,s}$

Answer: (A)

Q17.

Solution

Concept: For a second-order reaction, half-life is given by:

$$t_{1/2} = \frac{1}{k[A]_0}$$

Unlike first-order reactions, the half-life of a second-order reaction depends inversely on initial concentration.

Solution: Given: $k = 0.01\, L\, mol^{-1} s^{-1}$, $[A]_0 = 0.1\, M$

$$t_{1/2} = \frac{1}{0.01 \times 0.1} = \frac{1}{0.001} = 1000\, s$$

Dependence: As concentration decreases, half-life increases. Thus, second-order reactions take longer to reach completion at lower concentrations.

Final Answer: $\boxed{1000\, s}$

Answer: (A)

Q18.

Solution

Concept: Atomic radii trends:

- Across a period: decreases due to increase in nuclear charge.
- Down a group: increases due to addition of new shells.

Electron affinity trends:

- Across a period: generally increases (more negative) due to higher nuclear attraction.
- Down a group: generally decreases due to increase in atomic size.

Solution: Given elements: F, Cl, Br, I (Group 17)Expected trend:

$$F > Cl > Br > I$$

But anomaly:

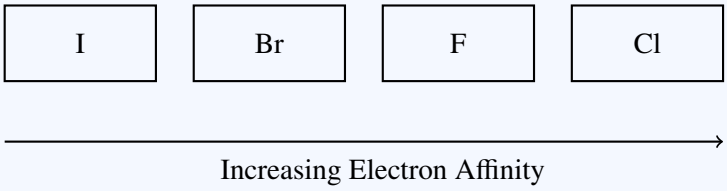
- Fluorine has very small size
- Strong electron-electron repulsion in compact $2p$ orbitals

Thus, Cl has higher electron affinity than F.

Order:

$$Cl > F > Br > I$$

Explanation: Chlorine has optimal size and less repulsion compared to fluorine, making it more favorable to accept an electron.



Final Answer: Cl

Answer: (A)

Q19.

Solution

Concept: Nitrogen shows anomalous behavior in group 15 due to its small size, high electronegativity, high ionization energy, and absence of vacant d-orbitals in its valence shell. These factors make its chemistry different from other heavier group members like P, As, Sb, and Bi.

Solution: Nitrogen has electronic configuration $1s^2 2s^2 2p^3$ and belongs to the second period. Unlike other group 15 elements, it does not have d-orbitals available in its valence shell. Formation of pentahalides (like PCl_5) requires expansion of octet, which involves use of vacant d-orbitals.Since nitrogen cannot expand its octet beyond 8 electrons, it cannot accommodate five halogen atoms around it. Hence, it does not form pentahalides such as NCl_5.Additionally, its small size leads to strong repulsion between electron pairs, further preventing formation of such highly coordinated compounds.Thus, the absence of d-orbitals is the primary reason for this anomalous behavior.

Final Answer: Absence of d-orbitals

Answer: (A)

Q20.

Solution

Concept: Diborane (B_2H_6) is an electron-deficient molecule in which boron does not have sufficient electrons to form normal two-center two-electron (2c–2e) bonds with all hydrogen atoms. To overcome this deficiency, it forms three-center two-electron (3c–2e) bonds, also called banana bonds.

Solution: Diborane consists of four terminal hydrogen atoms and two bridging hydrogen atoms. The four terminal B–H bonds are normal covalent (2c–2e) bonds. However, the two bridging hydrogens form bonds between the two boron atoms.

In these bridges, a pair of electrons is shared between two boron atoms and one hydrogen atom. Thus, each bridge involves three atoms but only two electrons, forming a 3c–2e bond. This type of bonding stabilizes the molecule despite electron deficiency.

The structure can be visualized as two boron atoms connected by two hydrogen bridges above and below the plane, giving a characteristic “banana bond” shape.

This unusual bonding explains why diborane does not follow the octet rule and is classified as an electron-deficient compound.

Final Answer: 3c–2e bonds

Answer: (A)

Q21.

Solution

Concept: The acidic strength of oxoacids depends on the number of ionizable –OH groups and the oxidation state of the central atom. Greater the number of oxygen atoms bonded to the central atom, greater is the electron-withdrawing effect, which stabilizes the conjugate base and increases acidity. Only hydrogen atoms attached to oxygen (–OH) are ionizable.

Solution: Structures: H_3PO_2 : one –OH group (monobasic) H_3PO_3 : two –OH groups (dibasic) H_3PO_4 : three –OH groups (tribasic)As the number of –OH groups increases, the number of ionizable hydrogens increases and the negative charge in conjugate base is better stabilized due to inductive effect of oxygen atoms.Thus, acidity increases in the order:

$$H_3PO_4 > H_3PO_3 > H_3PO_2$$

Final Answer: $\boxed{H_3PO_4 > H_3PO_3 > H_3PO_2}$

Answer: (A)

Q22.

Solution

Concept: In an octahedral field, d-orbitals split into lower energy t_{2g} and higher energy e_g levels. CFSE (Crystal Field Stabilization Energy) is calculated as:

$$\text{CFSE} = (-0.4 \times n_{t_{2g}} + 0.6 \times n_{e_g})\Delta_0$$

Solution: For d^5 high spin configuration: Electrons occupy all five orbitals singly before pairing:

$$t_{2g}^3 e_g^2$$

$$\text{CFSE} = (-0.4 \times 3 + 0.6 \times 2)\Delta_0$$

$$= (-1.2 + 1.2)\Delta_0 = 0$$

Final Answer: $\boxed{0}$

Answer: (A)

Q23.

Solution

Concept: Lanthanide contraction refers to the gradual decrease in atomic and ionic radii of lanthanides (from La to Lu) with increasing atomic number.Cause:

- Poor shielding of $4f$-electrons
- Increase in effective nuclear charge
- Stronger attraction of electrons towards nucleus

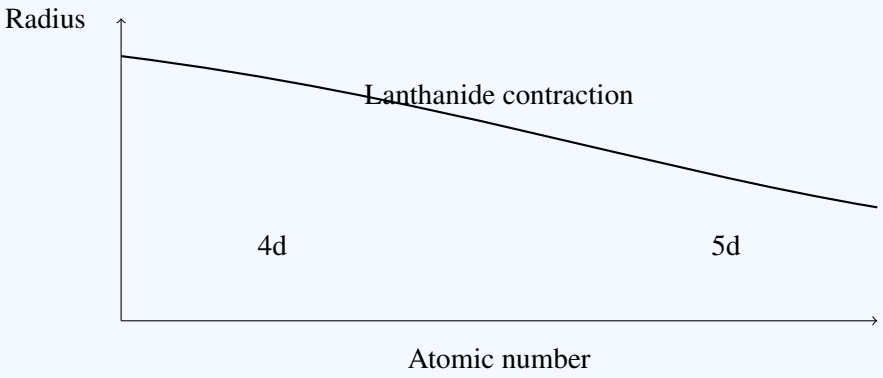
Solution: As we move across lanthanides:

Atomic radius decreases gradually

Impact on 4d and 5d elements:

- Radii of 5d elements become nearly equal to 4d elements (e.g., Zr ≈ Hf)
- Similar chemical properties of 4d and 5d transition elements
- Higher density and melting points for 5d elements

Explanation: Due to lanthanide contraction, the expected increase in size from 4d to 5d elements is offset, making their sizes comparable. This leads to similar chemistry and difficulty in separation.



Final Answer: Due to poor shielding of f-electrons

Answer: (A)

Q24.

Solution

Concept: Magnetic properties of transition metal complexes depend on the number of unpaired electrons present. Paramagnetic substances contain unpaired electrons, while diamagnetic substances have all electrons paired. The magnetic moment is calculated using the spin-only formula:

$$\mu = \sqrt{n(n+2)}\,\text{BM}$$

where n is the number of unpaired electrons.

Solution: Mn^{2+} has electronic configuration:

$$[\text{Ar}]\ 3d^5$$

All five d-electrons are unpaired:

$$n = 5$$

$$\mu = \sqrt{5(5+2)} = \sqrt{35} \approx 5.92\,BM$$

Thus, Mn^{2+} is strongly paramagnetic.

Final Answer: $5.92\,BM$

Answer: (A)

Q25.

Solution

Concept: Werner's coordination theory explains the structure and bonding in coordination compounds. According to this theory, metals exhibit two types of valencies: primary valency (oxidation state) and secondary valency (coordination number). These determine the composition and geometry of complexes.

Solution: Primary valency corresponds to the oxidation state of the metal and is satisfied by ions. It is ionisable and non-directional. Secondary valency corresponds to coordination number and is satisfied by ligands. It is non-ionisable and directional, determining geometry.Example: In $[Co(NH_3)_6]Cl_3$: Co has primary valency = +3 (satisfied by 3 Cl^- ions outside coordination sphere). Secondary valency = 6 (satisfied by 6 NH_3 ligands inside coordination sphere).Thus, Cl^- ions are ionisable (primary valency), while NH_3 ligands are non-ionisable (secondary valency).

Final Answer: Primary = ionisable, Secondary = non-ionisable

Answer: (A)

Q26.

Solution

Concept: Crystal Field Theory (CFT) explains splitting of d-orbitals when ligands approach a central metal ion. The magnitude and pattern of splitting depend on geometry and ligand arrangement.

Solution: In tetrahedral complexes, four ligands approach between the coordinate axes. The five d-orbitals split into two sets:

$$e\ (d_{z^2}, d_{x^2-y^2})\ \text{lower energy}$$

$$t_2\ (d_{xy}, d_{yz}, d_{xz})\ \text{higher energy}$$

This is opposite to octahedral complexes, where t_{2g} orbitals are lower and e_g orbitals are higher in energy.Also, the splitting energy in tetrahedral complexes (Δ_t) is smaller than in octahedral complexes (Δ_0) because:

- Only four ligands are present (less repulsion)
- Ligands do not approach directly along axes

Thus, $\Delta_t \approx \frac{4}{9}\Delta_0$.

Final Answer: $\boxed{\Delta_t < \Delta_0}$

Answer: (A)

Q27.

Solution

Concept: Chelation effect refers to enhanced stability of coordination compounds when multidentate ligands form ring structures with the central metal ion.

Solution: Chelated complexes are more stable than non-chelated ones due to two main reasons:

1. Entropy Increase: When a multidentate ligand replaces several monodentate ligands, the number of free particles increases, resulting in higher entropy. This makes the process thermodynamically favorable.

2. Ring Formation: Chelating ligands form stable cyclic structures (chelate rings) with the metal ion. These rings reduce the chances of ligand dissociation and strengthen bonding.Thus, chelation leads to greater thermodynamic and kinetic stability compared to complexes formed by monodentate ligands.

Final Answer: Due to entropy increase and ring formation

Answer: (A)

Q28.

Solution

Concept: Recrystallisation is a purification technique based on the difference in solubility of a compound in a suitable solvent at different temperatures. An impure solid is dissolved in a hot solvent and then allowed to cool so that pure crystals separate out while impurities remain in solution.

Solution: In recrystallisation, the impure substance is first dissolved in a minimum amount of hot solvent. On cooling, the solubility decreases and pure crystals are formed, leaving impurities in the mother liquor.

Criteria for solvent selection: The ideal solvent should:

- Dissolve a large amount of solute at high temperature but very little at low temperature
- Not react chemically with the solute
- Allow impurities to either remain insoluble or completely soluble
- Be volatile so it can be easily removed after crystallisation

Role of activated charcoal: Activated charcoal is used to remove colored impurities. It adsorbs these impurities on its surface due to its high surface area. The charcoal along with adsorbed impurities is then removed by filtration.Thus, recrystallisation provides pure crystals based on controlled solubility and removal of impurities.

Final Answer: Solvent dissolves solute at high temperature only

Answer: (A)

Q29.

Solution

Concept: Inductive effect is the electron donation or withdrawal through σ bonds, while resonance effect involves delocalization of electrons through π bonds. Both effects stabilize carbocations by dispersing the positive charge. Resonance provides greater stabilization than inductive effect because it spreads the charge over multiple atoms.

Solution: Tertiary carbocation is stabilized mainly by +I effect and hyperconjugation from three alkyl groups.Allyl carbocation is stabilized by resonance where the positive charge is delocalized over two carbon atoms.Benzyl carbocation is even more stabilized due to extensive resonance with the aromatic ring, allowing delocalization over multiple positions.Thus, stability order:

$$\text{benzyl} > \text{allyl} > \text{tertiary}$$

Since resonance stabilization is stronger than inductive effect, benzyl carbocation is most stable.

Final Answer: Benzyl carbocation

Answer: (A)

Q30.

Solution

Concept: Hyperconjugation is the delocalization of σ-electrons (usually C–H bonds) into an adjacent π-system or empty p-orbital. It stabilizes alkenes and carbocations by dispersing electron density. Greater the number of alkyl groups attached to the double bond, greater is hyperconjugation and hence stability.

Solution: Stability of alkenes increases with increasing substitution due to hyperconjugation and +I effect of alkyl groups.Ethene has no alkyl substituents $\Rightarrow$ least stable. Propene has one alkyl group $\Rightarrow$ more stable. But-2-ene has two alkyl groups $\Rightarrow$ more stable. 2-methylpropene has three alkyl groups $\Rightarrow$ most stable.Thus, increasing order of stability:

$$\text{ethene} < \text{propene} < \text{but-2-ene} < \text{2-methylpropene}$$

Final Answer: Ethene < propene < but-2-ene < 2-methylpropene

Answer: (A)

Q31.

Solution

Concept: The electromeric effect is a temporary effect involving complete transfer of π-electrons of a multiple bond to one of the bonded atoms in the presence of an attacking reagent. In contrast, the inductive effect is a permanent effect involving partial displacement of σ-electrons due to electronegativity differences.

Solution: Electromeric effect occurs only in unsaturated compounds and only when a reagent attacks. For example, in a carbonyl group (C=O), electrons may shift completely toward oxygen when attacked by a nucleophile.Inductive effect, however, is always present in polar bonds and decreases with distance. It does not require any attacking reagent.Thus, electromeric effect is temporary and reversible, while inductive effect is permanent.

Final Answer: Electromeric effect

Answer: (A)

Q32.

Solution

Concept: Benzene undergoes electrophilic substitution reactions due to its high electron density in the π-electron cloud. Aromaticity provides exceptional stability to benzene, and reactions that preserve this stability are favored. Electrophilic substitution involves replacement of a hydrogen atom by an electrophile without disturbing the aromatic ring.

Solution: Mechanism involves three steps:

1. Generation of electrophile: A strong electrophile (E^+) is produced using catalysts like $AlCl_3$ or $FeCl_3$.

2. Formation of carbocation (sigma complex): The electrophile attacks the benzene ring, forming a resonance-stabilized arenium ion (sigma complex), temporarily disrupting aromaticity.

3. Deprotonation: Loss of H^+ restores aromaticity, giving substituted benzene.Benzene prefers substitution over addition because addition reactions would break the delocalized π-electron system and destroy aromatic stability, which is energetically unfavorable.

Final Answer: To maintain aromatic stability

Answer: (A)

Q33.

Solution

Concept: Markovnikov's rule states that in addition of HX to an unsymmetrical alkene, hydrogen attaches to the carbon with more hydrogen atoms, and halogen attaches to the more substituted carbon. In presence of peroxides, HBr follows anti-Markovnikov addition due to a free radical mechanism (peroxide effect).

Solution: Propene reacts with HBr in presence of peroxide (ROOR) via free radical mechanism:

Initiation: Peroxide decomposes to form free radicals.

Propagation: Br· radical adds to the double bond forming a more stable radical intermediate.

Termination: Radical reacts with HBr to form product.Due to anti-Markovnikov addition, Br attaches to the less substituted carbon and H to the more substituted carbon.Thus, product formed is:

$$CH_3 - CH_2 - CH_2Br$$

Final Answer: 1-bromopropane

Answer: (A)

Q34.

Solution

Concept: Aromaticity is explained by Hückel's rule, which states that a planar, cyclic, conjugated system is aromatic if it contains $(4n + 2)\ \pi$ electrons, where n is an integer. Such systems are highly stable due to delocalization of π electrons.

Solution: Benzene has 6 π electrons ($n = 1$), satisfying $(4n + 2)$ rule, hence aromatic.Cyclopentadienyl anion has 6 π electrons (4 from double bonds + 2 from negative charge), also satisfying Hückel's rule, hence aromatic.Cyclobutadiene has 4 π electrons ($n = 1$ for $4n$), which makes it antiaromatic and unstable.Thus, only benzene and cyclopentadienyl anion are aromatic.

Final Answer: Benzene and cyclopentadienyl anion

Answer: (A)

Q35.

Solution

Concept: SN2 (Substitution Nucleophilic Bimolecular) reaction is a one-step mechanism where nucleophile attacks the substrate from the backside, leading to simultaneous bond formation and bond breaking. It follows second-order kinetics and involves an inverted configuration.

Solution: In SN2 mechanism, nucleophile approaches the carbon atom opposite to the leaving group, forming a transition state with partial bonds. The energy profile shows a single peak corresponding to this transition state.Primary alkyl halides react faster than tertiary ones because steric hindrance is minimal in primary carbons, allowing easy approach of nucleophile. In tertiary alkyl halides, bulky groups hinder the nucleophile, slowing down the reaction.Thus, reactivity order is:

Primary > Secondary > Tertiary

Final Answer: Due to less steric hindrance

Answer: (A)

Q36.

Solution

Concept: Elimination reactions involve removal of small molecules like HX to form alkenes. E1 is a two-step mechanism involving carbocation formation, while E2 is a one-step concerted mechanism. According to Saytzeff's rule, the more substituted alkene is the major product.

Solution: In dehydrohalogenation of 2-bromobutane (using alcoholic KOH), elimination occurs.

E2 mechanism (major): Base abstracts a β-hydrogen while Br leaves simultaneously.Possible products:

But-1-ene and But-2-ene

But-2-ene is more substituted and more stable due to hyperconjugation and alkyl substitution.Hence, major product is:

$$CH_3 - CH = CH - CH_3$$

Final Answer: But-2-ene

Answer: (A)

Q37.

Solution

Concept: Acidity depends on stability of the conjugate base. Resonance stabilizes the conjugate base, increasing acidity, while electron-withdrawing groups enhance acidity via –I effect. Alcohols lack resonance stabilization, making them less acidic.

Solution: Ethanol forms ethoxide ion, which has no resonance stabilization, hence least acidic.Phenol forms phenoxide ion, where negative charge is delocalized over the aromatic ring, increasing stability and acidity.p-Nitrophenol has a $–NO_2$ group (strong electron-withdrawing group) at para position. It stabilizes the phenoxide ion further through resonance and inductive effect, making it highly acidic.Thus, acidity order:

p-nitrophenol > phenol > ethanol

Final Answer: p-nitrophenol > phenol > ethanol

Answer: (A)

Q38.

Solution

Concept: Nucleophilic addition reactions occur at the carbonyl carbon of aldehydes and ketones due to the polar nature of the C=O bond. The carbonyl carbon is electrophilic and is attacked by nucleophiles.

Solution: Mechanism involves two steps:

1. Nucleophilic attack: Nucleophile attacks the electrophilic carbonyl carbon forming a tetrahedral intermediate.

2. Protonation: The intermediate is protonated to give the final product.Aldehydes are more reactive than ketones due to:

- **Less steric hindrance:** Aldehydes have one alkyl group, while ketones have two, making attack easier.
- **+I effect:** Alkyl groups donate electron density, reducing electrophilicity of carbonyl carbon in ketones.

Final Answer: Less steric hindrance and +I effect

Answer: (A)

Q39.

Solution

Concept: Alcohols undergo oxidation depending on their structure. Primary alcohols are first oxidised to aldehydes and then further oxidised to carboxylic acids in the presence of strong oxidising agents like $KMnO_4$ or $K_2Cr_2O_7$.

Solution: Primary alcohol ($R–CH_2OH$) undergoes oxidation in two steps:

$$R–CH_2OH \rightarrow R–CHO \rightarrow R–COOH$$

With a strong oxidising agent such as $KMnO_4$, the reaction proceeds completely to the carboxylic acid stage, bypassing isolation of the aldehyde.Thus, the final product obtained is a carboxylic acid.

Final Answer: Carboxylic acid

Answer: (A)

Q40.

Solution

Concept: Esterification is a reversible reaction between a carboxylic acid and an alcohol in the presence of an acid catalyst (usually conc. H_2SO_4) to form an ester and water. The reaction rate depends on temperature, concentration of reactants, and presence of catalyst.

Solution: General reaction:

$$\text{R–COOH} + \text{R'–OH}[\ ]H^+\text{R–COOR'} + H_2O$$

Factors affecting rate:

- Presence of acid catalyst increases rate
- Higher temperature favors faster reaction
- Removal of water shifts equilibrium forward

Hydrolysis: Under acidic conditions, ester undergoes hydrolysis (reverse reaction) to give back alcohol and carboxylic acid.

Final Answer: Forms alcohol and acid

Answer: (A)

Q41.

Solution

Concept: Basicity of amines depends on availability of lone pair on nitrogen and stability of the conjugate acid. In aqueous solution, solvation effects also play an important role along with inductive (+I) effect of alkyl groups.

Solution: Alkyl groups increase electron density on nitrogen by +I effect, increasing basicity. However, in aqueous solution, solvation stabilizes protonated amines differently:

- Secondary amines are most basic due to optimal balance of +I effect and solvation
- Primary amines are next
- Tertiary amines are less basic due to steric hindrance reducing solvation
- Ammonia is least basic

Thus, order is:

$$(CH_3)_2NH > CH_3NH_2 > (CH_3)_3N > NH_3$$

Final Answer: $(CH_3)_2NH > CH_3NH_2 > (CH_3)_3N > NH_3$

Answer: (A)

Q42.

Solution

Concept: Diazotization is the reaction of aromatic primary amines with nitrous acid ($NaNO_2$/HCl) at 0–5°C to form diazonium salts. These salts are highly reactive intermediates used in synthesis. Coupling reactions involve reaction of diazonium salts with activated aromatic compounds to form azo compounds.

Solution: Diazotization:

$$\text{Ar–NH}_2 + \text{HNO}_2 + \text{HCl} \rightarrow \text{Ar–N}_2^+\text{Cl}^- + 2H_2O$$

Coupling Reaction: Diazonium salts react with phenols or aromatic amines to form azo compounds:

$$\text{Ar–N}_2^+ + \text{Ar'–H} \rightarrow \text{Ar–N=N–Ar'}$$

These azo compounds contain the –N=N– linkage, which is highly conjugated and responsible for intense colors.

Importance: Diazonium salts are useful in synthesis of azo dyes because they form stable azo linkage (–N=N–), leading to colored compounds widely used in dyes and pigments.

Final Answer: Due to formation of stable azo linkage

Answer: (A)

Q43.

Solution

Concept: Proteins are polymers of amino acids linked by peptide bonds. Their structure determines their function and is organized into different levels: primary, secondary, and tertiary structures.

Solution: Primary structure: Linear sequence of amino acids linked by peptide bonds.

Secondary structure: Folding of polypeptide chain into α-helix or β-pleated sheet due to hydrogen bonding between backbone groups.

Tertiary structure: Three-dimensional folding of the entire polypeptide chain stabilized by various interactions like hydrogen bonds, ionic interactions, disulfide bonds, and van der Waals forces.

Function: Proteins perform structural, enzymatic, transport, and regulatory roles in living systems.

Stabilisation of secondary structure: Hydrogen bonds between C=O and N–H groups stabilize the structure.

Final Answer: Hydrogen bonding

Answer: (A)

Q44.

Solution

Concept: Glucose is an aldohexose sugar that exists in both open-chain and cyclic (hemiacetal) forms. Mutarotation is the change in optical rotation due to interconversion between α and β anomers in aqueous solution.

Solution: Structure: In aqueous solution, glucose predominantly exists in cyclic form (pyranose ring) formed by intramolecular reaction between –CHO and –OH groups.

Mutarotation: When α-D-glucose is dissolved in water, its optical rotation changes until equilibrium mixture of α and β forms is established. This change in rotation is called mutarotation.

Reducing nature: Glucose shows reducing properties because in solution it can open to form free aldehyde group (–CHO), which can reduce mild oxidising agents like Tollens' reagent or Fehling's solution.

Final Answer: Presence of free aldehyde group

Answer: (A)

Q45.

Solution

Concept: Chromatography is a separation technique based on differential distribution of components between stationary and mobile phases. Thin Layer Chromatography (TLC) is widely used for identification and purity analysis.

Solution: In TLC, compounds move at different rates depending on their affinity for stationary phase (adsorbent) and mobile phase (solvent).

R_f value:

$$R_f = \frac{\text{Distance travelled by solute}}{\text{Distance travelled by solvent front}}$$

Each compound has a characteristic R_f value under given conditions. By comparing R_f values with known standards, compounds can be identified.

Final Answer: Ratio of distance travelled by solute to solvent

Answer: (A)

Answer Key

Q	Ans	Q	Ans	Q	Ans	Q	Ans	Q	Ans
1	B	2	A	3	A	4	A	5	A
6	A	7	A	8	A	9	A	10	A
11	A	12	A	13	A	14	A	15	A
16	A	17	A	18	A	19	A	20	A
21	A	22	A	23	A	24	A	25	A
26	A	27	A	28	A	29	A	30	A
31	A	32	A	33	A	34	A	35	A
36	A	37	A	38	A	39	A	40	A
41	A	42	A	43	A	44	A	45	A