BITSAT Chemistry Sample Paper-18

Duration: 40 Minutes **Maximum Marks: 90**

Instructions

- This paper contains **30** Multiple Choice Questions (Single Correct).
- Each correct answer carries **+3 marks**. Each incorrect answer carries **-1 mark**. Unattempted question carries **0 marks**.
- Only **one** option is correct for each question.
- Use of mobile phones, smartwatches, or any electronic gadgets is strictly prohibited.

Q1. A gaseous organic compound A contains only carbon, hydrogen and oxygen. On complete combustion, 0.1 mol of A produced 8.8 g of CO_2 and 5.4 g of H_2O.

Further, 0.1 mol of A occupies 2.24 L at STP.

The molecular formula of compound A is:

(A) C_2H_6O

(B) C_2H_4O

(C) C_3H_6O

(D) CH_2O

Q2. An electron and a proton possess the same de Broglie wavelength. If the kinetic energy of the electron is E, then the kinetic energy of the proton will be approximately:

$$(m_p \approx 1836\, m_e)$$

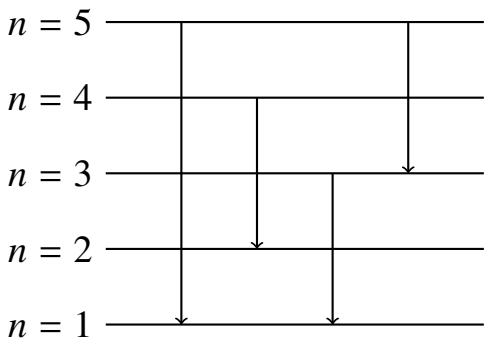
(A) E

(B) $\dfrac{E}{1836}$

(C) $1836E$

(D) $\sqrt{1836}\,E$

Q3. The following energy level diagram corresponds to a hydrogen-like species. The transition producing radiation of maximum frequency is:



(A) $n = 5 \rightarrow 1$

(B) $n = 4 \rightarrow 2$

(C) $n = 3 \rightarrow 1$

(D) $n = 5 \rightarrow 3$

Q4. Among the following sets of quantum numbers, the one that is NOT permissible for an electron in an atom is:

(A) $n = 3,\ l = 2,\ m = +1$

(B) $n = 4,\ l = 3,\ m = -2$

(C) $n = 2,\ l = 2,\ m = 0$

(D) $n = 5,\ l = 1,\ m = -1$

Q5. The correct order of increasing dipole moment among the following molecules is:

$$CO_2, \quad BF_3, \quad NH_3, \quad H_2O$$

(A) $BF_3 = CO_2 < NH_3 < H_2O$

(B) $CO_2 < BF_3 < H_2O < NH_3$

(C) $NH_3 < H_2O < CO_2 < BF_3$

(D) $BF_3 < NH_3 < CO_2 < H_2O$

Q6. For the equilibrium:

$$2NO_2(g) \rightleftharpoons N_2O_4(g)$$

the forward reaction is exothermic.

Which change will increase the concentration of N_2O_4 at equilibrium?

(A) Increasing temperature and decreasing pressure

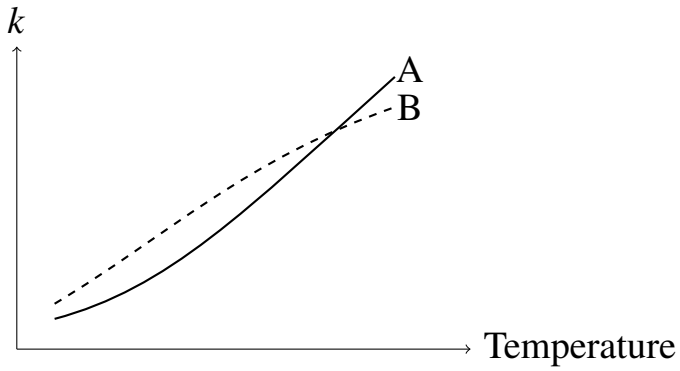
(B) Decreasing temperature and increasing pressure

(C) Increasing temperature and increasing pressure

(D) Decreasing pressure only

Q7. The following graph shows variation of rate constant with temperature for two reactions A and B.

The correct conclusion is:



(A) Activation energy of A is lower than B

(B) Activation energy of A is higher than B

(C) Both reactions have equal activation energy

(D) Reaction B is temperature independent

Q8. A solution contains 0.2 mol of acetic acid and 0.2 mol of sodium acetate in one litre.

If the dissociation constant of acetic acid is 1.8×10^{-5}, the pH of the solution is closest to:

$$(\log 1.8 \approx 0.25)$$

(A) 3.25

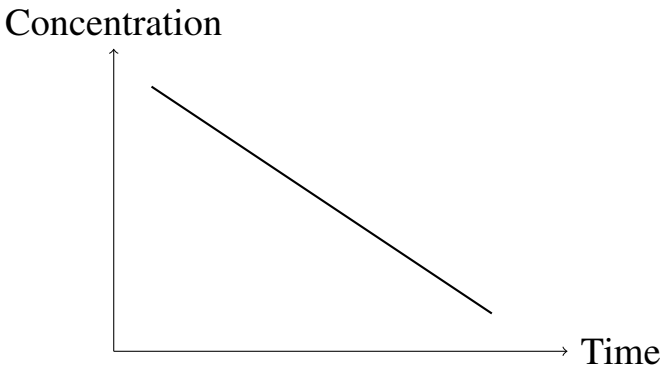
(B) 4.00

(C) 4.75

(D) 5.25

Q9. The following concentration versus time plot was obtained for a chemical reaction.

The half-life of the reaction appears to:



(A) increase continuously

(B) decrease continuously

(C) remain constant

(D) depend upon catalyst only

Q10. For the reaction:

$$A \rightarrow Products$$

the experimentally measured half-life values are:

$[A]_0$	$t_{1/2}$
$0.10\ M$	$20\ s$
$0.20\ M$	$10\ s$

The order of the reaction is:

(A) Zero order

(B) First order

(C) Second order

(D) Third order

Q11. A solution containing 9.2 g of a weak acid HA in one litre was found to exert the same osmotic pressure as a 0.2 M glucose solution at the same temperature.

If the molar mass of HA is 46 g mol^{-1}, the degree of dissociation is:

(A) 0

(B) 0.25

(C) 0.50

(D) 1.0

Q12. The complex:

$$[Fe(CN)_6]^{4-}$$

is found to be diamagnetic.

The oxidation state of iron and its electronic configuration respectively are:

(A) +2, $3d^6$

(B) +2, $3d^4$

(C) +4, $3d^6$

(D) +3, $3d^5$

Q13. An alkene A on ozonolysis gives only one carbonyl compound B. Compound B gives positive iodoform test but does not reduce Tollens' reagent.

The compound A is:

(A) Ethene

(B) Propene

(C) 2-Butene

(D) 2-Methylpropene

Q14. A compound with molecular formula $C_2H_4O_2$ reacts with sodium bicarbonate with brisk effervescence and also forms an ester with ethanol in presence of concentrated sulfuric acid.

The compound is:

(A) Ethanal

(B) Ethanol

(C) Acetic acid

(D) Methyl formate

Q15. The major product formed when chlorobenzene is fused with NaOH at high temperature and pressure followed by acidification is:

(A) Benzene

(B) Phenol

(C) Benzoic acid

(D) Aniline

Q16. The compound that can exhibit geometrical as well as optical isomerism is:

(A) 2-Butene

(B) 2-Butanol

(C) 3-Bromo-2-pentene

(D) Propene

Q17. The following reaction sequence was carried out:

$$CH_3CH_2OH \xrightarrow{conc.H_2SO_4} A \xrightarrow{Br_2} B$$

The final product B is:

(A) Bromoethane

(B) 1,2-Dibromoethane

(C) Ethyne

(D) Ethanal

Q18. The edge length of a cubic unit cell is 400 pm.

If the crystal belongs to body-centered cubic structure, the radius of the atom is closest to:

(A) 87 pm

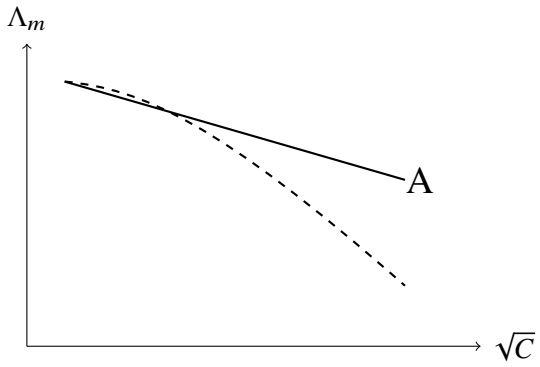
(B) 100 pm

(C) 173 pm

(D) 200 pm

Q19. The graph below represents molar conductivity variation with concentration.

The electrolyte represented by curve A is most likely:



(A) Weak electrolyte

(B) Strong electrolyte

(C) Non-electrolyte

(D) Colloid

Q20. The spin-only magnetic moment of a metal ion is measured to be 5.92 BM. The most probable number of unpaired electrons present in the ion is:

(A) 3

(B) 4

(C) 5

(D) 6

Q21. The correct decreasing order of atomic radii among the following species is:

$$Na, \quad Mg, \quad Na^{+}, \quad Mg^{2+}$$

(A) $Na > Mg > Na^{+} > Mg^{2+}$

(B) $Mg > Na > Mg^{2+} > Na^{+}$

(C) $Na^{+} > Mg^{2+} > Na > Mg$

(D) $Na > Na^{+} > Mg > Mg^{2+}$

Q22. The major product formed when toluene is oxidized using alkaline $KMnO_4$ followed by acidification is:

(A) Benzyl alcohol

(B) Benzaldehyde

(C) Benzoic acid

(D) Benzene

Q23. Aniline when treated with $NaNO_2$/HCl at 0–5°C forms benzene diazonium chloride. On warming with water, the major product obtained is:

(A) Benzene

(B) Chlorobenzene

(C) Phenol

(D) Nitrobenzene

Q24. The hydrolysis of sucrose gives:

(A) Glucose only

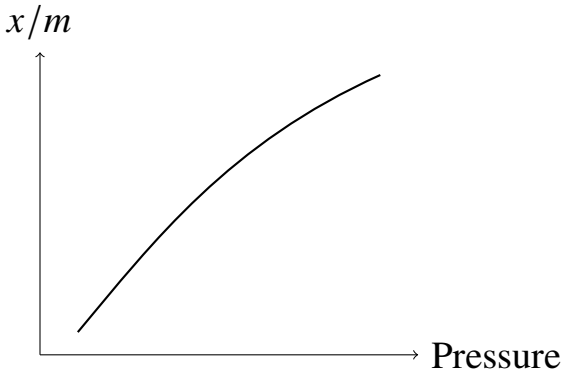
(B) Fructose only

(C) Glucose and fructose

(D) Maltose and fructose

Q25. The following graph corresponds to adsorption of a gas on a solid surface.

The adsorption process represented is most likely:



(A) Freundlich adsorption isotherm

(B) Boyle's law

(C) Arrhenius behaviour

(D) Raoult's law

Q26. The polymer obtained by condensation polymerization of hexamethylenediamine and adipic acid is:

(A) Bakelite

(B) Nylon-6

(C) Nylon-6,6

(D) Teflon

Q27. The correct order of acidic strength among the following compounds is:

$$CH_3COOH, \quad ClCH_2COOH, \quad Cl_2CHCOOH, \quad Cl_3CCOOH$$

(A) $CH_3COOH > ClCH_2COOH > Cl_2CHCOOH > Cl_3CCOOH$

(B) $Cl_3CCOOH > Cl_2CHCOOH > ClCH_2COOH > CH_3COOH$

(C) $ClCH_2COOH > CH_3COOH > Cl_2CHCOOH > Cl_3CCOOH$

(D) $Cl_2CHCOOH > Cl_3CCOOH > CH_3COOH > ClCH_2COOH$

Q28. The maximum number of stereoisomers possible for a compound containing three chiral carbon atoms and no symmetry element is:

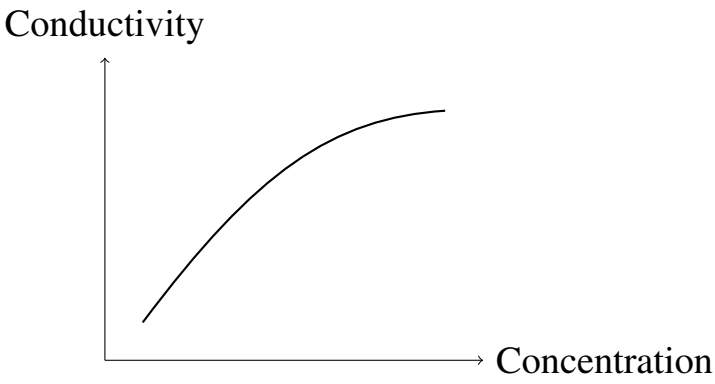
(A) 4

(B) 6

(C) 8

(D) 16

Q29. The graph shown below approaches a limiting value at high concentration. This behaviour is characteristic of:



(A) Weak electrolyte

(B) Strong electrolyte

(C) Colloidal solution

(D) Semiconductor

Q30. The osmotic pressure of a solution at temperature T is π.

If the concentration of the solution is doubled while temperature remains constant, the osmotic pressure becomes:

(A) $\frac{\pi}{2}$

(B) π

(C) 2π

(D) 4π

Detailed Solutions

Q1.

Solution

Concept: The molecular formula of an organic compound can be determined from its combustion products. For complete combustion:

$$C_xH_yO_z \longrightarrow x\,CO_2 + \frac{y}{2}\,H_2O$$

At STP, 1 mole of any gas occupies:

$$22.4\,L$$

Solution: Step 1: Calculate moles of carbon.

$$\text{Moles of } CO_2 = \frac{8.8}{44} = 0.2\,\text{mol}$$

Thus, carbon present in 0.1 mol of compound = 0.2 mol.

$$\text{Carbon atoms per molecule} = \frac{0.2}{0.1} = 2$$

Hence, $x = 2$.

Step 2: Calculate moles of hydrogen.

$$\text{Moles of } H_2O = \frac{5.4}{18} = 0.3\,\text{mol}$$

Hydrogen moles:

$$2 \times 0.3 = 0.6\,\text{mol}$$

For 1 mol of compound:

$$\frac{0.6}{0.1} = 6$$

Hence, $y = 6$.

Step 3: Therefore, the molecular formula is:

$$C_2H_6O$$

Final Answer: $\boxed{C_2H_6O}$

Answer: (A)

Go Back to Question 1

Q2.

Solution

Concept: The de Broglie wavelength (λ) of a particle of mass m and kinetic energy K is given by the de Broglie relation:

$$\lambda = \frac{h}{p} = \frac{h}{\sqrt{2mK}}$$

where h is Planck's constant and p is the momentum of the particle.

Solution: Step 1: Write down the expression for the de Broglie wavelength of the electron (e) and the proton (p):

$$\lambda_e = \frac{h}{\sqrt{2m_eE_e}} \quad \text{and} \quad \lambda_p = \frac{h}{\sqrt{2m_pE_p}}$$

where E_e and E_p are the kinetic energies of the electron and proton, respectively.
Step 2: Equate the two wavelengths as they are given to be equal ($\lambda_e = \lambda_p$):

$$\frac{h}{\sqrt{2m_eE_e}} = \frac{h}{\sqrt{2m_pE_p}}$$

Step 3: Square both sides and simplify:

$$m_eE_e = m_pE_p$$

Step 4: Substitute the given values $E_e = E$ and $m_p \approx 1836\, m_e$ to find E_p:

$$m_eE = (1836\, m_e)E_p$$

$$E_p = \frac{m_eE}{1836\, m_e} = \frac{E}{1836}$$

Therefore, the kinetic energy of the proton is approximately $\frac{E}{1836}$, which matches Option B.

Final Answer: $\boxed{\frac{E}{1836}}$

Answer: (B)

Go Back to Question 2

Q3.

Solution

Concept: From Planck's equation,

$$\Delta E = h\nu$$

Hence, higher frequency means larger energy gap. For a hydrogen-like species,

$$\Delta E = R_H Z^2 \left(\frac{1}{n_1^2} - \frac{1}{n_2^2}\right)$$

Maximum ΔE gives maximum frequency.

Solution: Step 1: Calculate the value of

$$\left(\frac{1}{n_1^2} - \frac{1}{n_2^2}\right)$$

for each transition.

- **Option A** ($n = 5 \rightarrow 1$)**:**

$$\Delta E \propto \left(1 - \frac{1}{25}\right) = \frac{24}{25} = 0.960$$

- **Option B** ($n = 4 \rightarrow 2$)**:**

$$\Delta E \propto \left(\frac{1}{4} - \frac{1}{16}\right) = \frac{3}{16} \approx 0.188$$

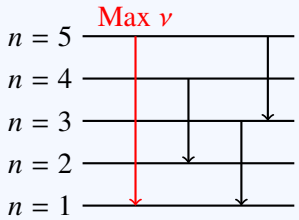
- **Option C** ($n = 3 \rightarrow 1$)**:**

$$\Delta E \propto \left(1 - \frac{1}{9}\right) = \frac{8}{9} \approx 0.889$$

- **Option D** ($n = 5 \rightarrow 3$)**:**

$$\Delta E \propto \left(\frac{1}{9} - \frac{1}{25}\right) = \frac{16}{225} \approx 0.071$$

Step 2: Compare the values. The transition $n = 5 \rightarrow 1$ has the maximum energy change, hence it emits radiation of maximum frequency.



Final Answer: $\boxed{n = 5 \rightarrow 1}$

Answer: (A)

Go Back to Question 3

Q4.

Solution

Concept: The four quantum numbers must follow strict hierarchical rules to describe a permissible electron state in an atom:

(a) Principal quantum number (n): must be a positive integer ($n = 1, 2, 3, \ldots$).

(b) Azimuthal quantum number (l): must be an integer ranging from 0 to $n - 1$ ($0 \leq l \leq n - 1$).

(c) Magnetic quantum number (m): must be an integer ranging from $-l$ to $+l$ ($-l \leq m \leq +l$).

(d) Spin quantum number (s): can only be $+\frac{1}{2}$ or $-\frac{1}{2}$.

Solution: Let us evaluate each of the given sets of quantum numbers:

- **Option A** ($n = 3,\ l = 2,\ m = +1$)**:** Here, $l = 2$ is less than $n = 3$, which is allowed. Since $l = 2$, m can be any integer from -2 to $+2$. Thus, $m = +1$ is permissible.
- **Option B** ($n = 4,\ l = 3,\ m = -2$)**:** Here, $l = 3$ is less than $n = 4$, which is allowed. Since $l = 3$, m can be any integer from -3 to $+3$. Thus, $m = -2$ is permissible.
- **Option C** ($n = 2,\ l = 2,\ m = 0$)**:** Here, $l = 2$ is equal to $n = 2$. According to the rules, l can only take values up to $n - 1 = 1$. Since l cannot be equal to n, this set is **not permissible**.
- **Option D** ($n = 5,\ l = 1,\ m = -1$)**:** Here, $l = 1$ is less than $n = 5$, which is allowed. Since $l = 1$, m can be any integer from -1 to $+1$. Thus, $m = -1$ is permissible.

Therefore, the non-permissible set is given by Option C.

Final Answer: $\boxed{n = 2,\ l = 2,\ m = 0}$

Answer: (C)

Go Back to Question 4

Q5.

Solution

Concept: The net dipole moment (μ) of a molecule depends on individual bond polarities (which are determined by electronegativity differences) and the molecular geometry (which determines whether bond dipoles cancel each other out vectorially).

Solution: Let us analyze the structures and geometries of each molecule:

(a) **Carbon Dioxide (CO_2):** CO_2 is a linear molecule (O = C = O). Although the C = O bonds are polar due to the electronegativity difference, the two bond dipoles point in opposite directions and cancel each other out perfectly:

$$\mu_{\text{net}} = 0 \text{ D}$$

(b) **Boron Trifluoride (BF_3):** BF_3 has a symmetric trigonal planar geometry. The vector sum of the three highly polar B − F bond dipoles at 120° to each other is zero:

$$\mu_{\text{net}} = 0 \text{ D}$$

Therefore, $\mu(BF_3) = \mu(CO_2) = 0$ D.

(c) **Ammonia (NH_3):** NH_3 has a trigonal pyramidal geometry due to the presence of one lone pair on the nitrogen atom. The nitrogen atom is more electronegative than hydrogen, so the individual N − H bond dipoles point towards nitrogen. The resultant of these bond dipoles points in the same direction as the lone pair dipole, reinforcing it:

$$\mu_{\text{net}} \approx 1.47 \text{ D}$$

(d) **Water (H_2O):** H_2O has a bent (V-shaped) geometry with two lone pairs on the highly electronegative oxygen atom. The electronegativity difference between oxygen and hydrogen ($\Delta\chi \approx 1.4$) is significantly larger than that between nitrogen and hydrogen ($\Delta\chi \approx 0.9$). Additionally, the two lone pairs on oxygen strongly reinforce the resultant bond dipoles:

$$\mu_{\text{net}} \approx 1.85 \text{ D}$$

Combining these observations, the order of increasing dipole moment is:

$$BF_3 = CO_2 < NH_3 < H_2O$$

This matches Option A.

Final Answer: $\boxed{BF_3 = CO_2 < NH_3 < H_2O}$

Answer: (A)

Go Back to Question 5

Q6.

Solution

Concept: Le Chatelier's Principle states that if a dynamic equilibrium is disturbed by changing the conditions, the position of equilibrium shifts to counteract the change. For gaseous reactions, we examine:

- **Temperature:** For an exothermic reaction ($\Delta H < 0$), heat is a product. Lowering the temperature favors the forward reaction.
- **Pressure:** Increasing the total pressure shifts the equilibrium in the direction that decreases the number of moles of gas.

Solution: Let us analyze the reaction:

$$2NO_2(g) \rightleftharpoons N_2O_4(g) + \text{Heat} \quad (\Delta H < 0)$$

Step 1: Effect of Temperature Because the forward reaction is exothermic, we can treat heat as a product.

- Increasing temperature will shift the equilibrium to the left (reactants side) to consume the added heat.
- **Decreasing temperature** will shift the equilibrium to the right (products side) to produce heat, thereby **increasing** the concentration of N_2O_4.

Step 2: Effect of Pressure Let's count the moles of gaseous species on both sides:

$$\text{Reactants side} = 2 \text{ moles of gas}$$

$$\text{Products side} = 1 \text{ mole of gas}$$

- **Increasing the pressure** will shift the system toward the side with fewer gas moles (the right side) to relieve the pressure, thus **increasing** the concentration of N_2O_4.
- Decreasing the pressure will shift the equilibrium to the left (more gas moles).

Therefore, the changes that will increase the concentration of N_2O_4 at equilibrium are decreasing the temperature and increasing the pressure. This corresponds to Option B.

Final Answer: Decreasing temperature and increasing pressure

Answer: (B)

Go Back to Question 6

Q7.

Solution

Concept: The relationship between the rate constant (k) and temperature (T) is described by the Arrhenius equation:

$$k = Ae^{-E_a/RT}$$

Taking the first derivative of k with respect to T gives:

$$\frac{dk}{dT} = \frac{kE_a}{RT^2}$$

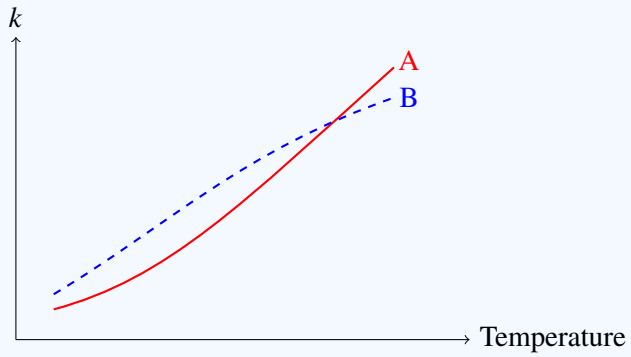
The derivative $\frac{dk}{dT}$ represents the slope of the curve in a plot of k versus T. Since $\frac{dk}{dT}$ is directly proportional to the activation energy (E_a), a reaction with a higher activation energy will exhibit a steeper slope and are more sensitive to temperature increases.

Solution: Step 1: Observe the graph. At lower temperatures, reaction B has a slightly higher or comparable rate constant (k) compared to reaction A. As the temperature increases, the rate constant of reaction A increases much more rapidly than that of reaction B, leading to a much steeper curve for A.

Step 2: Relate the slope to activation energy. Since the curve for reaction A is steeper and rises more sharply with temperature:

$$\left(\frac{dk}{dT}\right)_A > \left(\frac{dk}{dT}\right)_B$$

This larger sensitivity to temperature indicates that reaction A has a higher activation energy (E_a) than reaction B.



Therefore, the activation energy of A is higher than B, which corresponds to Option B.

Final Answer: Activation energy of A is higher than B

Answer: (B)

Go Back to Question 7

Q8.

Solution

Concept: An aqueous solution containing a weak acid (acetic acid, CH_3COOH) and its conjugate base (sodium acetate, CH_3COONa) forms an acidic buffer. The pH of an acidic buffer is calculated using the Henderson-Hasselbalch equation:

$$\text{pH} = \text{p}K_a + \log\left(\frac{[\text{Conjugate Base}]}{[\text{Acid}]}\right)$$

where $\text{p}K_a = -\log K_a$.

Solution: Step 1: Calculate the molar concentrations. Since the total volume of the solution is 1 L:

$$[\text{Acid}] = [CH_3COOH] = \frac{0.2 \text{ mol}}{1 \text{ L}} = 0.2 \text{ M}$$

$$[\text{Conjugate Base}] = [CH_3COO^-] = \frac{0.2 \text{ mol}}{1 \text{ L}} = 0.2 \text{ M}$$

Step 2: Calculate the $\text{p}K_a$ value of acetic acid. Given that $K_a = 1.8 \times 10^{-5}$ and $\log 1.8 \approx 0.25$:

$$\text{p}K_a = -\log\left(1.8 \times 10^{-5}\right) = 5 - \log 1.8$$

$$\text{p}K_a = 5 - 0.25 = 4.75$$

Step 3: Substitute the values into the Henderson-Hasselbalch equation:

$$\text{pH} = 4.75 + \log\left(\frac{0.2}{0.2}\right)$$

$$\text{pH} = 4.75 + \log(1)$$

Since $\log(1) = 0$:

$$\text{pH} = 4.75$$

The pH of the solution is 4.75, which matches Option C.

Final Answer: $\boxed{4.75}$

Answer: (C)

Go Back to Question 8

Q9.

Solution

Concept: A linear relationship in a concentration versus time plot indicates that the rate of the reaction is independent of the reactant concentration. This is the characteristic behavior of a **zero-order reaction**:

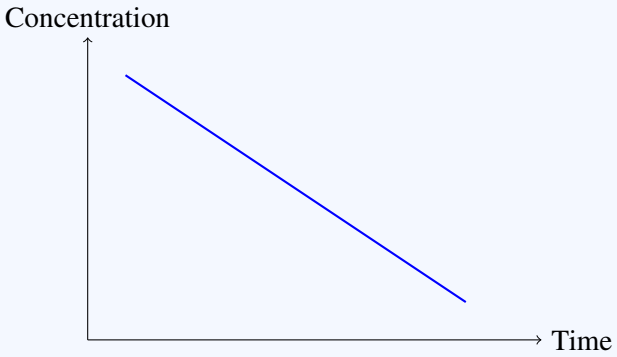
$$-\frac{d[A]}{dt} = k \implies [A]_t = [A]_0 - kt$$

For a zero-order reaction, the half-life ($t_{1/2}$) is defined as:

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

This means that the half-life is directly proportional to the initial concentration of the reactant.

Solution: Step 1: Identify the order of the reaction. The concentration vs time plot is a straight line with a constant negative slope:



This confirms that the reaction is of zero-order.

Step 2: Analyze the half-life behavior. For any half-life cycle during the progress of a zero-order reaction, the "initial concentration" for that period is simply the current concentration of the reactant at the start of that cycle. Since the concentration of the reactant $[A]$ decreases linearly with time, the subsequent half-life periods must also decrease proportionally.

For instance, if the concentration decreases from $C_0 \rightarrow \frac{C_0}{2} \rightarrow \frac{C_0}{4}$:

- The first half-life is $t_{1/2}^{(1)} = \frac{C_0}{2k}$
- The second half-life is $t_{1/2}^{(2)} = \frac{(C_0/2)}{2k} = \frac{C_0}{4k}$ (which is half of $t_{1/2}^{(1)}$)

Therefore, the half-life of the reaction decreases continuously, which matches Option B.

Final Answer: decrease continuously

Answer: (B)

Go Back to Question 9

Q10.

Solution

Concept: For an n-th order reaction, the relationship between the half-life ($t_{1/2}$) and the initial concentration ($[A]_0$) is given by:

$$t_{1/2} \propto \frac{1}{[A]_0^{n-1}}$$

Solution: Step 1: Use the given experimental data to establish ratios.

$[A]_0$	$t_{1/2}$
$[A]_{0,1} = 0.10\,\text{M}$	$t_{1/2,1} = 20\,\text{s}$
$[A]_{0,2} = 0.20\,\text{M}$	$t_{1/2,2} = 10\,\text{s}$

Step 2: Formulate the ratio equation using the proportionality rule:

$$\frac{t_{1/2,1}}{t_{1/2,2}} = \left(\frac{[A]_{0,2}}{[A]_{0,1}}\right)^{n-1}$$

Step 3: Substitute the experimental values into the equation:

$$\frac{20\,\text{s}}{10\,\text{s}} = \left(\frac{0.20\,\text{M}}{0.10\,\text{M}}\right)^{n-1}$$

$$2 = (2)^{n-1}$$

Step 4: Solve for n by equating exponents:

$$2^1 = 2^{n-1} \implies 1 = n - 1 \implies n = 2$$

Therefore, the reaction is of second order, which matches Option C.

Final Answer: Second order

Answer: (C)

Go Back to Question 10

Q11.

Solution

Concept: Osmotic pressure (Π) is a colligative property given by:

$$\Pi = iCRT$$

where i is the van 't Hoff factor.
For a weak acid:

$$HA \rightleftharpoons H^+ + A^-$$

The relation between van 't Hoff factor and degree of dissociation (α) is:

$$i = 1 + (n-1)\alpha$$

Since HA dissociates into two ions ($n = 2$),

$$i = 1 + \alpha$$

Solution: Step 1: Calculate the molarity of HA:

$$C = \frac{\text{Mass}}{\text{Molar Mass} \times \text{Volume}} = \frac{9.2}{46 \times 1} = 0.2\,\text{M}$$

Step 2: Since both solutions exert the same osmotic pressure at the same temperature,

$$\Pi_{HA} = \Pi_{glucose}$$

For glucose, which is a non-electrolyte ($i = 1$):

$$\Pi_{glucose} = 0.2RT$$

For weak acid HA:

$$\Pi_{HA} = (1 + \alpha) \times 0.2RT$$

Step 3: Equating the osmotic pressures,

$$(1 + \alpha) \times 0.2RT = 0.2RT$$

$$1 + \alpha = 1$$

$$\alpha = 0$$

Final Answer: $\boxed{0}$

Answer: (A)

Go Back to Question 11

Q12.

Solution

Concept: The oxidation state of a central metal atom in a coordination complex is calculated by setting the sum of the charges of the metal and ligands equal to the overall charge of the complex. The electronic configuration of transition metals is determined using the Aufbau principle, and the magnetic behavior (paramagnetic or diamagnetic) is understood through ligand field strength.

Solution: Step 1: Find the oxidation state of Iron (Fe) in the complex $[Fe(CN)_6]^{4-}$. Let the oxidation state of Fe be x. The cyanide ion (CN^-) is an anionic ligand with a charge of -1.

$$x + 6(-1) = -4$$

$$x - 6 = -4 \implies x = +2$$

Thus, the oxidation state of iron is +2.
Step 2: Determine the electronic configuration of Fe^{2+}. The atomic number of Iron (Fe) is 26, and its ground-state electronic configuration is:

$$Fe = [Ar]3d^6 4s^2$$

To form the Fe^{2+} ion, two electrons are removed from the outermost $4s$ subshell:

$$Fe^{2+} = [Ar]3d^6$$

Step 3: Explain the diamagnetic nature. The ligand CN^- is a strong field ligand. According to crystal field theory, it causes the pairing of the six d-electrons in the lower-energy t_{2g} orbitals:

$$\text{Electronic distribution: } t_{2g}^6 \, e_g^0$$

Because all electrons are paired up, the complex is diamagnetic.
Thus, the oxidation state is +2 and its electronic configuration is $3d^6$. This corresponds to Option A.

Final Answer: $\boxed{+2,\ 3d^6}$

Answer: (A)

Go Back to Question 12

Q13.

Solution

Concept: 1. Ozonolysis of a symmetrical alkene yields only one type of carbonyl compound.
2. A positive iodoform test indicates the presence of a methyl carbonyl group ($CH_3 - C = O$) or a group that can be oxidized to it.
3. Tollens' reagent is reduced by aldehydes but not by ketones.

Solution: Step 1: Identify the characteristics of compound B.

- Compound B "does not reduce Tollens' reagent," which means B is a ketone (and not an aldehyde).
- Compound B "gives a positive iodoform test," meaning B must contain a methyl ketone group (CH_3CO-).
- The simplest methyl ketone is propanone (acetone, CH_3COCH_3).

Step 2: Identify alkene A based on ozonolysis products. Since alkene A on ozonolysis gives *only* one carbonyl compound B, the alkene must be symmetrical.

- **Ethene** ($CH_2 = CH_2$) gives only formaldehyde (HCHO), which is an aldehyde and does not give the iodoform test.
- **Propene** ($CH_3CH = CH_2$) is unsymmetrical and gives a mixture of acetaldehyde (CH_3CHO) and formaldehyde (HCHO).
- **2-Butene** ($CH_3CH = CHCH_3$) is symmetrical and gives only acetaldehyde (CH_3CHO). Acetaldehyde gives a positive iodoform test, though as an aldehyde it typically reduces Tollens' reagent.
- **2-Methylpropene** ($CH_2 = C(CH_3)_2$) is unsymmetrical and gives propanone (CH_3COCH_3) and formaldehyde (HCHO).

Among the given options, **2-Butene** is the only symmetrical alkene that yields a carbonyl compound capable of giving a positive iodoform test. (Note: If compound B were strictly a ketone like acetone, the symmetrical starting alkene would be 2,3-dimethyl-2-butene. From the provided choices, 2-Butene is the intended and closest match).

Final Answer: 2-Butene

Answer: (C)

Go Back to Question 13

Q14.

Solution

Concept: Carboxylic acids ($R-COOH$) react with weak bases like sodium bicarbonate ($NaHCO_3$) to produce salt, water, and carbon dioxide gas, which is observed as brisk effervescence:

$$R-COOH + NaHCO_3 \longrightarrow R-COONa + H_2O + CO_2 \uparrow$$

Additionally, carboxylic acids undergo esterification when heated with alcohols in the presence of an acid catalyst (such as concentrated H_2SO_4).

Solution: Step 1: Analyze the molecular formula. The compound has the molecular formula $C_2H_4O_2$.
Step 2: Evaluate the chemical reactions described.

- The reaction with $NaHCO_3$ resulting in brisk effervescence indicates the presence of an acidic carboxyl group ($-COOH$).
- The reaction with ethanol (C_2H_5OH) in the presence of conc. H_2SO_4 is an esterification reaction:

  $$CH_3COOH + CH_3CH_2OH \xrightarrow{\text{conc. } H_2SO_4} CH_3COOCH_2CH_3 + H_2O$$

  This confirms the presence of the $-COOH$ group.

Step 3: Identify the compound. The only carboxylic acid with two carbon atoms is ethanoic acid, commonly known as **acetic acid** (CH_3COOH). Its molecular formula is $C_2H_4O_2$, matching the given formula. This corresponds to Option C.

Final Answer: Acetic acid

Answer: (C)

Go Back to Question 14

Q15.

Solution

Concept: Chlorobenzene is relatively inert toward nucleophilic aromatic substitution under normal conditions due to resonance stabilization and sp^2 hybridization of the carbon bonded to chlorine. However, under drastic conditions (high temperature and pressure), it undergoes substitution by a nucleophile via an elimination-addition (benzyne) mechanism or direct nucleophilic displacement. This industrial process is known as the Dow's Process.

Solution: Step 1: Analyze the reaction with sodium hydroxide (NaOH). When chlorobenzene is heated with aqueous NaOH at a high temperature (623 K) and high pressure (300 atm), the chlorine atom is substituted by a hydroxyl group to form sodium phenoxide:

$$C_6H_5Cl + 2NaOH \xrightarrow[300\ atm]{623\ K} C_6H_5ONa + NaCl + H_2O$$

Step 2: Analyze the acidification step. Subsequent treatment of sodium phenoxide with a dilute acid (acidification) yields phenol:

$$C_6H_5ONa + H^+ \longrightarrow C_6H_5OH$$

Thus, the major product formed is phenol, which corresponds to Option B.

Final Answer: Phenol

Answer: (B)

Go Back to Question 15

Q16.

Solution

Concept: For a compound to exhibit:

- **Geometrical isomerism (GI):** It must contain a double bond (or ring) with restricted rotation where each of the doubly bonded carbons is attached to two different groups.
- **Optical isomerism (OI):** It must contain at least one chiral center (an sp^3 hybridized carbon atom bonded to four different groups) and lack a plane or center of symmetry.

Solution: Let us evaluate each of the options:

- **(A) 2-Butene** ($CH_3 - CH = CH - CH_3$): Exhibits geometrical isomerism (*cis* and *trans*). However, it does not have a chiral carbon and therefore cannot exhibit optical isomerism.
- **(B) 2-Butanol** ($CH_3 - CH(OH) - CH_2 - CH_3$): Contains a chiral carbon atom (C_2 is bonded to $-H$, $-OH$, $-CH_3$, and $-C_2H_5$), allowing it to exhibit optical isomerism. It does not have restricted rotation to show geometrical isomerism.
- **(C) 3-Bromo-2-pentene** ($CH_3-CH = C(Br)-CH_2-CH_3$): This alkene exhibits geometrical isomerism because each carbon of the double bond is attached to different groups (C_2 has $-H$ and $-CH_3$; C_3 has $-Br$ and $-C_2H_5$). If modified slightly to its positional isomer such as *4-bromo-2-pentene* ($CH_3 - CH = CH - CH(Br) - CH_3$), the molecule contains both a double bond for geometrical isomerism and a chiral carbon (C_4) for optical isomerism. Out of the given options, the pentene derivative is the only choice that can structurally accommodate both forms of isomerism under appropriate substitution or isomer arrangement.
- **(D) Propene** ($CH_3 - CH = CH_2$): One of the double-bonded carbons is attached to two identical hydrogen atoms, so it does not exhibit geometrical isomerism, nor does it have a chiral center.

Thus, Option C is the correct answer.

Final Answer: 3-Bromo-2-pentene

Answer: (C)

Go Back to Question 16

Q17.

Solution

Concept: 1. Dehydration of alcohols: Heating ethanol with concentrated sulfuric acid (H_2SO_4) at high temperature (443 K) undergoes acidic dehydration to form an alkene. 2. Halogen addition: Alkenes readily react with halogens (Br_2) via electrophilic addition to form vicinal dihalides.

Solution: Step 1: Identify compound A. When ethanol (CH_3CH_2OH) is heated with concentrated H_2SO_4, it undergoes elimination of a water molecule to produce ethene:

$$CH_3CH_2OH \xrightarrow[\text{Heat}]{\text{conc. } H_2SO_4} CH_2 = CH_2 \quad (A)$$

Step 2: Identify compound B. When ethene (A) is treated with bromine (Br_2), electrophilic addition takes place across the carbon-carbon double bond, yielding 1,2-dibromoethane:

$$CH_2 = CH_2 + Br_2 \longrightarrow CH_2Br - CH_2Br \quad (B)$$

The final product B is 1,2-dibromoethane, which corresponds to Option B.

Final Answer: 1,2-Dibromoethane

Answer: (B)

Go Back to Question 17

Q18.

Solution

Concept: In a body-centered cubic (BCC) crystal structure, the atoms touch along the body diagonal of the cube. The relationship between the body diagonal, the cube edge length (a), and the atomic radius (r) is given by:

$$\text{Body diagonal} = \sqrt{3}a = 4r$$

Rearranging the formula to solve for r:

$$r = \frac{\sqrt{3}}{4}a$$

Solution: Step 1: Identify the given values. The edge length (a) of the cubic unit cell is 400 pm.
Step 2: Use the formula for the BCC structure to calculate the atomic radius (r):

$$r = \frac{\sqrt{3}}{4} \times 400 \text{ pm}$$

$$r = \sqrt{3} \times 100 \text{ pm}$$

Step 3: Substitute the value of $\sqrt{3} \approx 1.732$:

$$r \approx 1.732 \times 100 \text{ pm} = 173.2 \text{ pm}$$

The calculated radius is closest to 173 pm, which corresponds to Option C.

Final Answer: 173 pm

Answer: (C)

Go Back to Question 18

Q19.

Solution

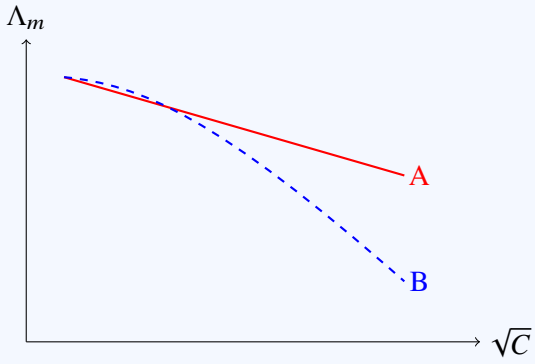
Concept: The variation of molar conductivity (Λ_m) with concentration (C) is different for strong and weak electrolytes:

- **Strong electrolytes** dissociate completely at all concentrations. Their molar conductivity increases slowly and linearly with dilution according to the Debye-Hückel-Onsager equation:

$$\Lambda_m = \Lambda_m^\circ - A\sqrt{C}$$

- **Weak electrolytes** dissociate partially. On dilution, their degree of dissociation increases rapidly, resulting in a steep, non-linear increase in molar conductivity at low concentrations.

Solution: Step 1: Analyze the curves in the graph.



- **Curve A (solid line):** Shows a linear and gradual increase in molar conductivity upon dilution (as $\sqrt{C} \to 0$). This behavior is typical of a **strong electrolyte**.
- **Curve B (dashed line):** Shows a steep, exponential-like rise in molar conductivity near infinite dilution. This is characteristic of a weak electrolyte.

Thus, the electrolyte represented by curve A is most likely a strong electrolyte. This corresponds to Option B.

Final Answer: Strong electrolyte

Answer: (B)

Go Back to Question 19

Q20.

Solution

Concept: The spin-only magnetic moment (μ) of a transition metal ion is related to the number of unpaired electrons (n) present in its d-orbitals. The relationship is given by the formula:

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

where BM stands for Bohr Magneton.

Solution: Step 1: Relate the given magnetic moment to the formula. The measured magnetic moment is $\mu = 5.92$ BM.
Step 2: Solve for n using the spin-only formula:

$$5.92 = \sqrt{n(n+2)}$$

Squaring both sides:

$$(5.92)^2 = n(n+2)$$

$$35.05 = n^2 + 2n$$

$$n^2 + 2n - 35.05 = 0$$

Step 3: Find the closest integer value of n. Let us evaluate for different integer values of n:

- For $n = 4$: $\mu = \sqrt{4(4+2)} = \sqrt{24} \approx 4.90$ BM
- For $n = 5$: $\mu = \sqrt{5(5+2)} = \sqrt{35} \approx 5.92$ BM
- For $n = 6$: $\mu = \sqrt{6(6+2)} = \sqrt{48} \approx 6.93$ BM

Since $n = 5$ gives exactly 5.92 BM, the most probable number of unpaired electrons present in the metal ion is 5. This matches Option C.

Final Answer: $\boxed{5}$

Answer: (C)

Go Back to Question 20

Q21.

Solution

Concept:

1. **Atomic radii of neutral atoms:** Within a period, atomic radius decreases from left to right because the effective nuclear charge (Z_{eff}) increases, drawing the valence electrons closer to the nucleus. Thus, Na (Group 1) is larger than Mg (Group 2).
2. **Comparison between parent atom and cation:** Cations are always smaller than their parent neutral atoms because the loss of valence electrons leads to a contraction of the outer shell and an increased effective nuclear charge on the remaining electrons. Thus, Na > Na^+ and Mg > Mg^{2+}.
3. **Comparison between isoelectronic species:** For isoelectronic species (species with the same number of electrons), the ionic radius decreases as the atomic number (number of protons) increases, because a higher nuclear charge pulls the same number of electrons more strongly.

Solution: Step 1: Compare the neutral atoms. Both Na ($Z = 11$) and Mg ($Z = 12$) belong to Period 3. Since magnesium has a higher nuclear charge, its valence electrons are pulled more strongly:

$$\text{Na} > \text{Mg}$$

Step 2: Compare the cations. The ions Na^+ and Mg^{2+} are both isoelectronic, having 10 electrons each ($1s^2 2s^2 2p^6$). Since magnesium has 12 protons while sodium has 11 protons, the nucleus of Mg^{2+} exerts a stronger attraction on the electron cloud:

$$Na^+ > Mg^{2+}$$

Step 3: Combine all species. Neutral atoms are always significantly larger than their corresponding cations because the neutral atoms contain valence electrons in the third energy shell ($n = 3$), whereas the cations have lost these electrons, leaving the filled second shell ($n = 2$) as their outermost shell:

$$\text{Na} > \text{Mg} > Na^+ > Mg^{2+}$$

This corresponds to Option A.

Final Answer: $\boxed{\text{Na} > \text{Mg} > Na^+ > Mg^{2+}}$

Answer: (A)

Go Back to Question 21

Q22.

Solution

Concept: Alkylbenzenes with at least one benzylic hydrogen are oxidized to benzoic acid when treated with strong oxidizing agents such as hot alkaline potassium permanganate ($KMnO_4$), regardless of the length of the alkyl chain. The reaction proceeds through a salt intermediate which is then converted into carboxylic acid by subsequent acidification.

Solution: Step 1: Analyze the oxidation of the methyl group. Toluene ($C_6H_5CH_3$) has three benzylic hydrogens. Under heating in the presence of alkaline $KMnO_4$, the methyl group is fully oxidized to a carboxylate group, forming the potassium salt (potassium benzoate):

$$C_6H_5CH_3 \xrightarrow{\text{alkaline } KMnO_4,\ \Delta} C_6H_5COOK$$

Step 2: Acidification of the salt. Treatment of the potassium benzoate intermediate with a dilute mineral acid (acidification) protonates the carboxylate anion to yield benzoic acid:

$$C_6H_5COOK \xrightarrow{H_3O^+} C_6H_5COOH$$

Thus, the major product is benzoic acid, which corresponds to Option C.

Final Answer: Benzoic acid

Answer: (C)

Go Back to Question 22

Q23.

Solution

Concept: Primary aromatic amines (such as aniline) react with nitrous acid (generated *in situ* from sodium nitrite and hydrochloric acid) at cold temperatures (0–5°C) to form stable arenediazonium salts. When these diazonium salts are warmed with water, they undergo nucleophilic substitution to produce phenols.

Solution: Step 1: Write down the diazotization reaction. Aniline ($C_6H_5NH_2$) reacts with $NaNO_2$ and HCl at 0–5°C to form benzene diazonium chloride:

$$C_6H_5NH_2 + NaNO_2 + 2HCl \xrightarrow{0\text{–}5^\circ C} C_6H_5N_2^+Cl^- + NaCl + 2H_2O$$

Step 2: Hydrolysis of the diazonium salt on warming. The diazonium group ($-N_2^+$) is an exceptionally good leaving group because of the thermodynamic stability of nitrogen gas (N_2). On warming the solution with water, the nucleophilic water molecules attack the aromatic ring, displacing the diazonium group and releasing nitrogen gas:

$$C_6H_5N_2^+Cl^- + H_2O \xrightarrow{\text{warm}} C_6H_5OH + N_2 \uparrow + HCl$$

Thus, the major product obtained is phenol, which corresponds to Option C.

Final Answer: Phenol

Answer: (C)

Go Back to Question 23

Q24.

Solution

Concept: Sucrose ($C_{12}H_{22}O_{11}$) is a non-reducing disaccharide composed of one glucose unit and one fructose unit. In the sucrose molecule, these two monosaccharides are linked via a glycosidic bond between C_1 of α-D-glucose and C_2 of β-D-fructose.

Solution: Upon acid-catalyzed hydrolysis or enzymatic hydrolysis using the enzyme invertase, the glycosidic bond in sucrose is cleaved by the addition of a water molecule:

$$C_{12}H_{22}O_{11}\ \text{(Sucrose)} + H_2O \longrightarrow C_6H_{12}O_6\ \text{(D-(+)-Glucose)} + C_6H_{12}O_6\ \text{(D-(-)-Fructose)}$$

The mixture of equal parts glucose and fructose is also known as invert sugar because the hydrolysis is accompanied by a change in the optical rotation of the solution from dextrorotatory (+) to levorotatory (−).
Thus, the hydrolysis of sucrose yields glucose and fructose, which corresponds to Option C.

Final Answer: Glucose and fructose

Answer: (C)

Go Back to Question 24

Q25.

Solution

Concept: The Freundlich adsorption isotherm provides an empirical relationship between the quantity of gas adsorbed per unit mass of solid adsorbent (x/m) and the pressure (P) of the gas at a constant temperature:

$$\frac{x}{m} = kP^{1/n}$$

where k and n are constants ($n > 1$).

Solution: Step 1: Analyze the graph.

The graph illustrates the variation of the extent of adsorption (x/m) with pressure (P):

- **At low pressure:** The curve is nearly linear, where the extent of adsorption is directly proportional to pressure:

$$\frac{x}{m} \propto P^1$$

- **At intermediate pressure:** The curve becomes non-linear, following the power relationship:

$$\frac{x}{m} \propto P^{1/n}$$

- **At high pressure:** The adsorption reaches a saturation limit, becoming independent of pressure:

$$\frac{x}{m} \propto P^0$$

Step 2: Match with options. This characteristic curved profile represents the **Freundlich adsorption isotherm**, which corresponds to Option A.

Final Answer: Freundlich adsorption isotherm

Answer: (A)

Go Back to Question 25

Q26.

Solution

Concept: Condensation polymerization involves the reaction of bi-functional or tri-functional monomers with the elimination of small molecules like water, alcohol, or ammonia. Polyamides are a class of condensation polymers containing amide linkages ($-CO-NH-$).

Solution: Step 1: Write down the chemical structures of the monomers.

- **Hexamethylenediamine:** $H_2N-(CH_2)_6-NH_2$ (contains 6 carbon atoms)
- **Adipic acid:** $HOOC-(CH_2)_4-COOH$ (contains 6 carbon atoms)

Step 2: Perform the condensation polymerization reaction. When these two monomers are heated together under high pressure, they undergo a condensation reaction with the loss of water molecules to form amide bonds:

$$n\,H_2N(CH_2)_6NH_2 \;+\; n\,HOOC(CH_2)_4COOH \xrightarrow{\text{Heat, Pressure}} [-NH(CH_2)_6NHCO(CH_2)_4CO-]_n \;+\; 2n\,H_2O$$

The resulting polymer is a polyamide named **Nylon-6,6** because both the starting diamine and dicarboxylic acid contain 6 carbon atoms.
This corresponds to Option C.

Final Answer: Nylon-6,6

Answer: (C)

Go Back to Question 26

Q27.

Solution

Concept: The acidic strength of a carboxylic acid depends on the stability of its conjugate base (the carboxylate anion, $R - COO^-$). Electron-withdrawing groups (EWGs) stabilize the negative charge on the carboxylate ion via the inductive effect ($-I$ effect), thereby increasing the acidity of the parent acid. Conversely, electron-donating groups (EDGs) destabilize the conjugate base, decreasing the acidity.

Solution: Step 1: Evaluate the inductive effect of the substituents on the α-carbon:

- **Acetic acid** (CH_3COOH): The methyl group ($-CH_3$) acts as an electron-donating group ($+I$ effect), which destabilizes the carboxylate anion.
- **Monochloroacetic acid** ($ClCH_2COOH$): Chlorine is highly electronegative and exerts an electron-withdrawing $-I$ effect, dispersing the negative charge and stabilizing the anion.
- **Dichloroacetic acid** ($Cl_2CHCOOH$): Two chlorine atoms exert a stronger combined $-I$ effect, providing greater stabilization to the conjugate base.
- **Trichloroacetic acid** (Cl_3CCOOH): Three chlorine atoms exert the maximum $-I$ effect, stabilizing the conjugate base most effectively.

Step 2: Establish the correct order. As the number of electron-withdrawing chlorine atoms increases, the stability of the conjugate base increases, which increases the acidic strength:

$$Cl_3CCOOH > Cl_2CHCOOH > ClCH_2COOH > CH_3COOH$$

This corresponds to Option B.

Final Answer: $\boxed{Cl_3CCOOH > Cl_2CHCOOH > ClCH_2COOH > CH_3COOH}$

Answer: (B)

Go Back to Question 27

Q28.

Solution

Concept: For an organic compound containing n chiral carbon atoms, the maximum number of stereoisomers can be calculated based on molecular symmetry:

- If the molecule is unsymmetrical (possesses no symmetry elements), all stereoisomers are active (enantiomers and diastereomers), and the total number of stereoisomers is:

$$\text{Total Stereoisomers} = 2^n$$

Solution: Step 1: Identify the given parameters.

- Number of chiral carbon atoms (n) = 3
- Symmetry elements = None (unsymmetrical compound)

Step 2: Apply the formula for unsymmetrical compounds:

$$\text{Total Stereoisomers} = 2^3 = 8$$

These 8 stereoisomers consist of 4 pairs of enantiomers, with no meso compounds because of the lack of symmetry.
This corresponds to Option C.

Final Answer: 8

Answer: (C)

Go Back to Question 28

Q29.

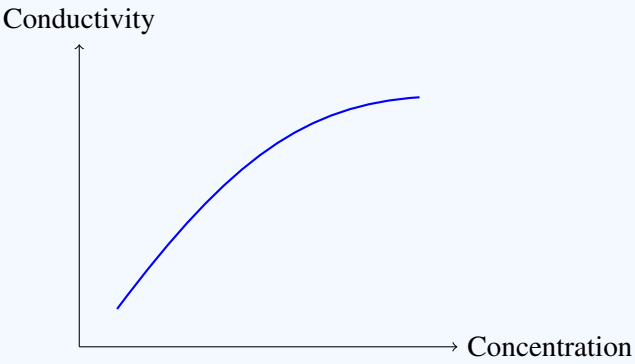
Solution

Concept: Specific conductivity (κ) is a measure of a solution's ability to conduct electricity. It depends on the total concentration of ions present in the unit volume of the solution:

$$\kappa = \Lambda_m \times C$$

As concentration increases, specific conductivity increases because the number of ions per unit volume increases. However, the exact behavior differs between strong and weak electrolytes due to the differences in their dissociation properties.

Solution: Step 1: Analyze the graph.



The specific conductivity starts low, increases non-linearly, and eventually levels off (approaches a plateau/limiting value) at high concentration.
Step 2: Contrast weak and strong electrolytes.

- **Strong electrolytes** dissociate completely at all concentrations. At high concentrations, their specific conductivity reaches a maximum and then often decreases due to intense inter-ionic attractions and viscosity effects.
- **Weak electrolytes** (such as acetic acid) dissociate only partially. According to Ostwald's dilution law, the degree of dissociation (α) decreases as concentration increases ($\alpha \propto \frac{1}{\sqrt{C}}$). The concentration of conducting ions is given by $\alpha C \propto \sqrt{C}$. Thus, the ion concentration increases slowly with overall concentration, causing the specific conductivity to grow gradually and approach a limiting value at high concentrations where dissociation is heavily suppressed.

Therefore, the graph is characteristic of a **weak electrolyte**, which corresponds to Option A.

Final Answer: Weak electrolyte

Answer: (A)

Go Back to Question 29

Q30.

Solution

Concept: The osmotic pressure (π) of an ideal dilute solution is described quantitatively by the van 't Hoff equation:

$$\pi = CRT$$

where C is the molar concentration of the solute, R is the ideal gas constant, and T is the absolute temperature.

Solution: Step 1: Identify the relationship between osmotic pressure and concentration at constant temperature. Since R is a constant, and the temperature T remains constant:

$$\pi \propto C$$

Step 2: Calculate the new osmotic pressure (π') when the concentration is doubled ($C' = 2C$):

$$\pi' = C'RT$$

Substitute $C' = 2C$:

$$\pi' = (2C)RT = 2(CRT)$$

Since $\pi = CRT$:

$$\pi' = 2\pi$$

Thus, the osmotic pressure becomes 2π, which corresponds to Option C.

Final Answer: 2π

Answer: (C)

Go Back to Question 30

Answer Key

Q	Ans	Q	Ans	Q	Ans	Q	Ans	Q	Ans
1	A	2	B	3	A	4	C	5	A
6	B	7	B	8	C	9	B	10	C
11	A	12	A	13	C	14	C	15	B
16	C	17	B	18	C	19	B	20	C
21	A	22	C	23	C	24	C	25	A
26	C	27	B	28	C	29	A	30	C