MHT-CET Chemistry Sample Paper-14

Duration: 45 Minutes **Maximum Marks: 50**

Instructions

- This paper contains a total of **50** Multiple Choice Questions.
- Each correct answer carries **+1 marks**.
- No negative marking for incorrect questions.
- Use of mobile phones, smartwatches, or any electronic gadgets is strictly prohibited.
- No marks will be deducted for questions that are left unattempted.

Q1. Which of the following transitions in the Hydrogen spectrum falls in the visible region?

(A) Lyman series

(B) Balmer series

(C) Paschen series

(D) Brackett series

Q2. The number of sigma (σ) and pi (π) bonds in Ethyne (C_2H_2) are respectively:

(A) 2, 3

(B) 3, 2

(C) 3, 1

(D) 1, 2

Q3. According to the Third Law of Thermodynamics, the entropy of a perfectly crystalline substance is zero at:

(A) 273 K

(B) $0°C$

(C) 0 K

(D) 100 K

Q4. The oxidation state of Phosphorus in H_3PO_3 is:

(A) +3

(B) +5

(C) +1

(D) -3

Q5. Which of the following is a "peroxy" acid of Sulphur?

(A) H_2SO_4

(B) $H_2S_2O_7$

(C) H_2SO_5

(D) $H_2S_2O_3$

Q6. In the production of Ammonia by Haber's process, the catalyst used is:

(A) V_2O_5

(B) Finely divided Iron

(C) Pt gauge

(D) Ni

Q7. The coordination number of an atom in a body-centered cubic (bcc) structure is:

(A) 4

(B) 6

(C) 8

(D) 12

Q8. Colligative properties depend on:

(A) Nature of solute

(B) Nature of solvent

(C) Number of solute particles

(D) Size of solute particles

Q9. The unit of molar conductivity (Λ_m) is:

(A) $S\ cm^2\ mol^{-1}$

(B) $S\ cm^{-1}\ mol^{-1}$

(C) $S\ cm\ mol^{-1}$

(D) $S\ cm^2\ mol$

Q10. A reaction is spontaneous at all temperatures if:

(A) $\Delta H = +ve, \Delta S = +ve$

(B) $\Delta H = -ve, \Delta S = -ve$

(C) $\Delta H = -ve, \Delta S = +ve$

(D) $\Delta H = +ve, \Delta S = -ve$

Q11. The order of a reaction for which the rate constant has the same units as the rate of reaction is:

(A) First order

(B) Second order

(C) Zero order

(D) Fractional order

Q12. Which of the following is the strongest oxidizing agent?

(A) F_2

(B) Cl_2

(C) Br_2

(D) I_2

Q13. Identify the most acidic compound among the following:

(A) Phenol

(B) o-Nitrophenol

(C) p-Nitrophenol

(D) 2,4,6-Trinitrophenol

Q14. The reaction $R - COCl + H_2 \xrightarrow{Pd/BaSO_4} R - CHO + HCl$ is known as:

(A) Stephen reaction

(B) Rosenmund reduction

(C) Cannizzaro reaction

(D) Etard reaction

Q15. Which of the following amines does not react with Hinsberg's reagent?

(A) CH_3NH_2

(B) $(CH_3)_2NH$

(C) $(CH_3)_3N$

(D) $C_6H_5NH_2$

Q16. Nylon-6 is prepared from:

(A) Adipic acid

(B) Caprolactam

(C) Hexamethylenediamine

(D) Terephthalic acid

Q17. Which vitamin is water-soluble?

(A) Vitamin A

(B) Vitamin D

(C) Vitamin C

(D) Vitamin E

Q18. The catalyst used in the hydrogenation of oils is:

(A) V_2O_5

(B) Ni

(C) Fe

(D) Pt

Q19. The geometry of SF_6 molecule is:

(A) Trigonal bipyramidal

(B) Octahedral

(C) Hexagonal

(D) Tetrahedral

Q20. Which of the following is an example of an elastomer?

(A) Nylon-6,6

(B) Terylene

(C) Buna-S

(D) Bakelite

Q21. The linkage present in proteins is:

(A) Glycosidic linkage

(B) Peptide linkage

(C) Ester linkage

(D) Phosphodiester linkage

Q22. The correct order of magnetic moments (spin-only) is:

(A) $Mn^{2+} > Fe^{2+} > Co^{2+}$

(B) $Fe^{2+} > Mn^{2+} > Co^{2+}$

(C) $Co^{2+} > Fe^{2+} > Mn^{2+}$

(D) $Mn^{2+} = Fe^{2+} = Co^{2+}$

Q23. Which of the following is not a greenhouse gas?

(A) CO_2

(B) CH_4

(C) O_2

(D) O_3

Q24. The process of heating the ore in a limited supply of air below its melting point is:

(A) Roasting

(B) Calcination

(C) Smelting

(D) Leaching

Q25. The half-life period of a first-order reaction is 69.3 seconds. Its rate constant is:

(A) $10^{-2}\ s^{-1}$

(B) $10^{-4}\ s^{-1}$

(C) $10\ s^{-1}$

(D) $0.693\ s^{-1}$

Q26. Which of the following is a paramagnetic gas?

(A) N_2

(B) O_2

(C) H_2

(D) CO_2

Q27. The element with the highest second ionization enthalpy is:

(A) Li

(B) Be

(C) B

(D) C

Q28. Schottky defect is observed in crystals when:

(A) An ion leaves its normal site and occupies an interstitial site.

(B) Unequal number of cations and anions are missing.

(C) Equal number of cations and anions are missing.

(D) Density of the crystal increases.

Q29. Which of the following is an intensive property?

(A) Enthalpy

(B) Internal energy

(C) Density

(D) Volume

Q30. The IUPAC name of $K_3[Fe(CN)_6]$ is:

(A) Potassium hexacyanoferrate(II)

(B) Potassium hexacyanoferrate(III)

(C) Tripotassium hexacyanoiron(II)

(D) Potassium cyanoferrate(III)

Q31. Which indicator is used in the titration of CH_3COOH with $NaOH$?

(A) Methyl orange

(B) Phenolphthalein

(C) Methyl red

(D) Starch

Q32. The reagent used in the Etard reaction is:

(A) CrO_2Cl_2

(B) $SnCl_2/HCl$

(C) $KMnO_4$

(D) $LiAlH_4$

Q33. Sucrose on hydrolysis gives:

(A) Two molecules of Glucose

(B) Two molecules of Fructose

(C) One Glucose and one Fructose

(D) One Glucose and one Galactose

Q34. Which of the following shows the highest $+I$ effect?

(A) $-CH_3$

(B) $-CH_2CH_3$

(C) $-CH(CH_3)_2$

(D) $-C(CH_3)_3$

Q35. The gas leaked in the Bhopal gas tragedy was:

(A) Methyl isocyanate

(B) Ethyl isocyanate

(C) Phosgene

(D) Carbon monoxide

Q36. The number of lone pairs in XeF_2 is:

(A) 1

(B) 2

(C) 3

(D) 4

Q37. Which of the following is an antidepressant drug?

(A) Iproniazid

(B) Aspirin

(C) Penicillin

(D) Chloramphenicol

Q38. The relationship between Solubility (S) and K_{sp} for Ag_2CrO_4 is:

(A) $K_{sp} = S^2$

(B) $K_{sp} = 4S^3$

(C) $K_{sp} = 27S^4$

(D) $K_{sp} = 108S^5$

Q39. Which of the following is a primary battery?

(A) Lead storage battery
(B) Mercury cell
(C) Fuel cell
(D) Nickel-cadmium cell

Q40. The molarity of a solution containing 4.0 g of $NaOH$ in 500 mL of solution is:

(A) 0.1 M
(B) 0.2 M
(C) 0.5 M
(D) 1.0 M

Q41. The boiling point of water is higher than H_2S because of:

(A) van der Waals forces
(B) Hydrogen bonding
(C) Covalent bonding
(D) Ionic bonding

Q42. Identify the optically active compound among the following:

(A) 2-Chloropropane
(B) 2-Chlorobutane
(C) 1-Chlorobutane
(D) Propan-2-ol

Q43. The monomer of PVC is:

(A) Ethylene

(B) Vinyl chloride

(C) Tetrafluoroethylene

(D) Styrene

Q44. Which of the following is a neutral oxide?

(A) NO_2

(B) N_2O

(C) P_2O_5

(D) SO_2

Q45. The osmotic pressure of a solution can be increased by:

(A) Increasing volume

(B) Increasing temperature

(C) Decreasing concentration

(D) Adding more solvent

Q46. What is the coordination number of Cl^- in $NaCl$ crystal?

(A) 4

(B) 6

(C) 8

(D) 12

Q47. Formaldehyde reacts with Methyl magnesium bromide followed by hydrolysis to give:

(A) Methanol

(B) Ethanol

(C) Propan-2-ol

(D) 2-Methylpropan-2-ol

Q48. Which of the following is used in the vulcanization of rubber?

(A) Phosphorus

(B) Sulphur

(C) Carbon

(D) Nitrogen

Q49. The pH of a buffer solution containing equal concentrations of weak acid and its conjugate base is:

(A) 7

(B) pK_a

(C) pK_b

(D) 0

Q50. The reaction $CH_3CH_2I + KOH(aq) \rightarrow CH_3CH_2OH + KI$ is an example of:

(A) Electrophilic substitution

(B) Nucleophilic substitution

(C) Electrophilic addition

(D) Nucleophilic addition

Detailed Solutions

Q1.

Solution

Concept:
The Hydrogen emission spectrum is formed when an electron in a hydrogen atom transitions from a higher energy level (n_2) to a lower energy level (n_1), emitting a photon. The wavelength (or frequency) of the emitted radiation depends on the energy difference between the two levels, given by the Rydberg formula:

$$\frac{1}{\lambda} = R\left(\frac{1}{n_1^2} - \frac{1}{n_2^2}\right), \quad n_2 > n_1$$

Different values of n_1 correspond to different spectral series, each lying in a specific region of the electromagnetic spectrum.

Solution:
We analyze each spectral series by step:
1. **Lyman series ($n_1 = 1$):** - Here, electrons fall to the ground state ($n = 1$). - The energy difference is very large, so the emitted photons have very high energy and very short wavelength. - Therefore, these lines lie in the **Ultraviolet (UV)** region.
2. **Balmer series ($n_1 = 2$):** - Electrons transition to the second energy level ($n = 2$). - The energy difference is moderate compared to the Lyman series. - The wavelengths fall in the range of approximately 400 nm to 700 nm. - This range corresponds to the **visible region** of the electromagnetic spectrum.
3. **Paschen series ($n_1 = 3$):** - Transitions end at $n = 3$. - The energy differences are smaller than Balmer transitions. - Hence, the emitted radiation lies in the **Infrared (IR)** region.
4. **Brackett ($n_1 = 4$) and Pfund ($n_1 = 5$) series:** - These involve even smaller energy differences. - The wavelengths are longer, so they also fall in the **Infrared (IR)** region.
5. **Conclusion from comparison:** - Only the Balmer series has wavelengths that lie within the visible range detectable by the human eye. - All other series are either in UV or IR regions, which are not visible.

Final Answer: The Balmer series falls in the visible region.

Answer: (B)

Q2.

Solution

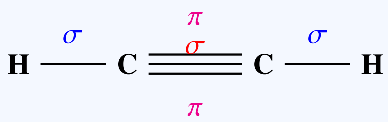
Concept:

Chemical bonding in Alkynes (C_nH_{2n-2}). In any covalent structure:

- Every single bond is a sigma (σ) bond.
- A double bond consists of 1σ and 1π bond.
- A triple bond consists of 1σ and 2π bonds.

Solution:

1: Write the expanded structural formula of Ethyne (Acetylene): $H - C \equiv C - H$.
2: Count the σ bonds. There are two $C - H$ single bonds and one σ bond within the $C \equiv C$ triple bond. Total $\sigma = 1 + 1 + 1 = 3$.
3: Count the π bonds. The $C \equiv C$ triple bond contains two π bonds. Total $\pi = 2$.
4: Therefore, the number of σ and π bonds are 3 and 2 respectively.



Structural representation of Ethyne

Final Answer:

$$\boxed{3, 2}$$

Answer: (B)

Q3.

Solution

Concept:
The Third Law of Thermodynamics establishes a reference point for entropy. It states that the entropy of a perfectly ordered crystalline substance approaches zero as the temperature approaches absolute zero.

Solution:
1. **Meaning of Entropy:** Entropy (S) is a measure of randomness or disorder in a system. Higher disorder means higher entropy.
2. **Condition at Absolute Zero:** At 0 K, thermal motion of particles ceases completely. The system reaches its lowest possible energy state.
3. **Perfect Crystal Assumption:** In a perfect crystal, all atoms or molecules are arranged in a perfectly ordered structure with no defects.
4. **Number of Microstates:** Since there is only one possible arrangement, the number of microstates is $W = 1$.
5. **Applying Boltzmann Equation:**

$$S = k \ln W$$

Substituting $W = 1$:

$$S = k \ln(1) = 0$$

6. **Conclusion:** Therefore, entropy becomes zero at absolute zero for a perfectly crystalline substance.
7. **Additional Note:** Absolute zero corresponds to $0\ K = -273.15°C$.

Final Answer: Entropy is zero at 0 K.

Answer: (C)

Q4.

Solution

Concept:

The oxidation state of an element is determined by assigning standard oxidation numbers to known elements and ensuring that the total equals the overall charge of the compound.

Solution:

1. **Given Compound:** H_3PO_3 (Phosphorous acid).
2. **Assign Known Oxidation States:** Hydrogen (H) = +1 (in most compounds) Oxygen (O) = −2
3. **Let Oxidation State of Phosphorus = x:**
4. **Set up the Equation:** Since the molecule is neutral, the sum of oxidation states is zero:

$$3(+1) + x + 3(-2) = 0$$

5. **Simplify the Equation:**

$$3 + x - 6 = 0$$

6. **Solve for x:**

$$x - 3 = 0$$

$$x = +3$$

7. **Structural Insight:** Although there are three hydrogen atoms, only two are bonded to oxygen (–OH groups), making the acid dibasic. The third hydrogen is directly bonded to phosphorus.

Final Answer: The oxidation state of P is +3.

Answer: (A)

Q5.

Solution

Concept:

Peroxy acids are characterized by the presence of a peroxide linkage ($-O-O-$), where each oxygen atom has an oxidation state of -1 instead of the usual -2.

Solution:

1. H_2SO_4 **(Sulphuric acid):** Contains only $S=O$ and $S-OH$ bonds; no $-O-O-$ linkage is present.
2. $H_2S_2O_7$ **(Pyrosulphuric acid/Oleum):** Contains an $S-O-S$ bridge, not a peroxide linkage.
3. H_2SO_5 **(Peroxomonosulphuric acid, Caro's acid):** Contains a $-O-O-$ (peroxo) linkage in the form of $S-O-O-H$. This confirms it is a peroxy acid.
4. $H_2S_2O_3$ **(Thiosulphuric acid):** One oxygen atom is replaced by sulphur; no peroxide linkage exists.
5. **Additional Note:** Another example of a sulphur peroxy acid is $H_2S_2O_8$ (Marshall's acid), which also contains a peroxide linkage.
6. **Conclusion:** Only H_2SO_5 satisfies the defining feature of a peroxy acid.

Final Answer: H_2SO_5 is a peroxy acid of Sulphur.

Answer: (C)

Q6.

Solution

Concept:

Haber's process is used for the industrial synthesis of ammonia. It involves a reversible and exothermic reaction between nitrogen and hydrogen, requiring specific conditions and a catalyst.

Solution:

1. **Balanced Chemical Equation:**

$$N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$$

2. **Nature of Reaction:** The reaction is exothermic (releases heat), so lower temperatures favor ammonia formation, but higher temperatures are needed for a reasonable rate.
3. **Catalyst Used:** Finely divided Iron (Fe) is used as the main catalyst to speed up the reaction.
4. **Role of Promoters:** Substances like Molybdenum (Mo), Potassium oxide (K_2O), and Aluminium oxide (Al_2O_3) act as promoters to enhance the efficiency and activity of the iron catalyst.
5. **Operating Conditions:** - Pressure: $\sim 200\ atm$ (high pressure favors product formation) - Temperature: $\sim 700\ K$ (compromise between rate and yield)
6. **Conclusion:** The catalyst plays a crucial role in making the process industrially viable.

Final Answer: Finely divided Iron is used as the catalyst.

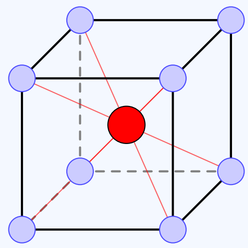
Answer: (B)

Q7.

Solution

Concept:
The coordination number is defined as the number of nearest neighbor atoms (atoms that are in direct physical contact) surrounding a specific atom in a crystal lattice.

Solution:
1: In a Body-Centered Cubic (BCC) unit cell, there are atoms at each of the 8 corners of the cube and one central atom located exactly at the body center.
2: The atom at the body center $(1/2, 1/2, 1/2)$ is equidistant from all 8 corner atoms. In a stable BCC lattice, these 8 corner atoms are the "nearest neighbors" to the central atom.
3: Similarly, if we extend the lattice, each corner atom is shared by 8 unit cells, making it the center of its own group of 8 body-centered atoms.
4: Therefore, the coordination number (total number of nearest neighbors) is 8.



BCC Unit Cell (CN = 8)

Final Answer:

$$\boxed{8}$$

Answer: (C)

Q8.

Solution

Concept:
Colligative properties depend only on the number of solute particles present in a solution, not on their chemical nature.

Solution:
1. **Definition:** Colligative properties are those properties of solutions that depend only on the ratio of the number of solute particles to solvent molecules.
2. **Key Idea:** These properties are independent of the chemical identity, size, or structure of the solute particles.
3. **Examples of Colligative Properties:** - Relative lowering of vapour pressure - Elevation of boiling point - Depression of freezing point - Osmotic pressure
4. **Role of Number of Particles:** The magnitude of these properties increases with the number of solute particles present in the solution.
5. **Special Case (Electrolytes):** Substances like $NaCl$ dissociate into ions (Na^+ and Cl^-), effectively increasing the number of particles. This leads to a greater effect on colligative properties.
6. **Conclusion:** Therefore, only the number of solute particles determines colligative properties.

Final Answer: They depend on the Number of solute particles.

Answer: (C)

Q9.

Solution

Concept:

Molar conductivity (Λ_m) represents the conductance of all ions produced by one mole of an electrolyte dissolved in a given volume of solution.

Solution:

1. **Formula Used:**

$$\Lambda_m = \frac{\kappa \times 1000}{M}$$

2. **Units of Each Quantity:** - Specific conductance (κ): $S\ cm^{-1}$ - Molarity (M): $mol\ L^{-1} = mol\ (1000\ cm^3)^{-1}$

3. **Substituting Units:**

$$\Lambda_m = \frac{S\ cm^{-1} \times 1000\ cm^3}{mol}$$

4. **Simplification:**

$$\Lambda_m = S\ cm^2\ mol^{-1}$$

5. **Alternative Representation:** Since $S = \Omega^{-1}$:

$$\Lambda_m = \Omega^{-1}\ cm^2\ mol^{-1}$$

6. **Conclusion:** The unit clearly shows conductance per mole.

Final Answer: The unit of molar conductivity is $S\ cm^2\ mol^{-1}$.

Answer: (A)

Q10.

Solution

Concept:

The spontaneity of a process is governed by Gibbs free energy change:

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

A reaction is spontaneous if $\Delta G < 0$.

Solution:

1. **Case 1:** $\Delta H < 0, \Delta S > 0$ - ΔH is negative (exothermic reaction). - ΔS is positive (increase in disorder). - Therefore, $-T\Delta S$ is also negative. - Hence, ΔG is always negative at all temperatures.
2. **Case 2:** $\Delta H > 0, \Delta S < 0$ - Both terms contribute positively to ΔG. - Reaction is never spontaneous.
3. **Case 3:** $\Delta H > 0, \Delta S > 0$ - Spontaneous at high temperatures when $T\Delta S$ dominates.
4. **Case 4:** $\Delta H < 0, \Delta S < 0$ - Spontaneous at low temperatures.
5. **Conclusion:** Only when $\Delta H < 0$ and $\Delta S > 0$, the reaction is spontaneous at all temperatures.

Final Answer: Spontaneous at all temperatures if $\Delta H = -ve, \Delta S = +ve$.

Answer: (C)

Q11.

Solution

Concept:
The order of a reaction determines how the rate depends on the concentration of reactants.
Solution:
1. **General Rate Law:**
$$\text{Rate} = k[A]^n$$
2. **Units of Rate:**
$$mol\ L^{-1}\ s^{-1}$$
3. **Given Condition:** The rate constant k has the same units as the rate.
4. **Unit Analysis:**
$$mol\ L^{-1}\ s^{-1} = k \cdot (mol\ L^{-1})^n$$
5. **Inference:** For k to have the same units as rate, $(mol\ L^{-1})^n$ must be dimensionless.
6. **Thus:**
$$n = 0$$
7. **Conclusion:** The reaction rate does not depend on concentration.

Final Answer: The reaction is of Zero order.

Answer: (C)

Q12.

Solution

Concept:
Oxidizing power refers to the ability of a substance to gain electrons (get reduced). It is measured using standard reduction potential values.
Solution:
1. **Trend in Halogens:** Moving down Group 17, oxidizing power decreases.
2. **Fluorine (F_2):** Has the highest standard reduction potential (+2.87 V).
3. **Reason:** - Very high electronegativity - Weak $F-F$ bond - High hydration enthalpy of F^-
4. **Order of Oxidizing Power:**
$$F_2 > Cl_2 > Br_2 > I_2$$
5. **Conclusion:** Fluorine is the strongest oxidizing agent.

Final Answer: F_2 is the strongest oxidizing agent.

Answer: (A)

Q13.

Solution

Concept:
Electron-withdrawing groups increase the acidity of phenols by stabilizing the phenoxide ion.

Solution:

1. **Phenol:** Acts as the base reference for acidity.
2. **Effect of Nitro Group ($-NO_2$):** Strong electron-withdrawing group showing $-I$ and $-R$ effects.
3. **Impact on Stability:** The negative charge on the phenoxide ion is delocalized over the ring.
4. **More Nitro Groups $\Rightarrow$ More Stability:** Increased delocalization leads to higher acidity.
5. **Picric Acid:** $2, 4, 6$-Trinitrophenol contains three nitro groups, making it highly acidic.
6. **Order:** Picric acid > p-Nitrophenol > o-Nitrophenol > Phenol.

Final Answer: 2,4,6-Trinitrophenol is the most acidic.

Answer: (D)

Q14.

Solution

Concept:
Selective reduction of acid chlorides to aldehydes is achieved using a poisoned catalyst.

Solution:

1. **Reaction:**

$$R - COCl + H_2 \xrightarrow{Pd/BaSO_4} R - CHO + HCl$$

2. **Catalyst Used:** Palladium (Pd) supported on Barium sulphate ($BaSO_4$).
3. **Poisoning of Catalyst:** Substances like sulphur or quinoline reduce catalyst activity.
4. **Purpose:** Prevents further reduction of aldehyde to alcohol.
5. **Name of Reaction:** Rosenmund reduction.

Final Answer: This is the Rosenmund reduction.

Answer: (B)

Q15.

Solution

Concept:

Hinsberg's reagent helps distinguish between different classes of amines based on their reactivity.

Solution:

1. **Primary Amines** (1°)**:** Form sulphonamides that are soluble in alkali due to acidic hydrogen.
2. **Secondary Amines** (2°)**:** Form sulphonamides that are insoluble in alkali (no acidic hydrogen).
3. **Tertiary Amines** (3°)**:** Do not react due to absence of hydrogen attached to nitrogen.
4. **Given Compound:** $(CH_3)_3N$ is a tertiary amine.
5. **Conclusion:** It does not react with Hinsberg's reagent.

Final Answer: $(CH_3)_3N$ does not react with Hinsberg's reagent.

Answer: (C)

Q16.

Solution

Concept:

Nylon-6 is a homopolymer formed by the ring-opening polymerization of a single monomer. Unlike Nylon-6,6, which is made from a diamine and a diacid, Nylon-6 gets its name because its monomer contains six carbon atoms.

Solution:

1. Monomer: Caprolactam (a cyclic amide).
2. Process: Caprolactam is heated with water at high temperatures ($533 - 543\ K$).
3. Mechanism: The ring opens to form ϵ-aminocaproic acid, which then undergoes polymerization to form the linear polymer, Nylon-6.
4. Use: It is used for the manufacture of tire cords, fabrics, and ropes.

Final Answer: Nylon-6 is prepared from Caprolactam.

Answer: (B)

Q17.

Solution

Concept:
Vitamins are classified into two groups based on their solubility in water or fat (lipids).
Solution:
1. Fat-soluble vitamins: These are soluble in lipids and stored in the liver and adipose tissues. Examples include Vitamins A, D, E, and K.
2. Water-soluble vitamins: These are soluble in water and are generally not stored in the body (except Vitamin B12); they must be supplied regularly in the diet as they are excreted in urine.
3. Examples of water-soluble vitamins: Vitamin C (Ascorbic acid) and the B-group vitamins.
4. Therefore, Vitamin C is water-soluble.
Final Answer: Vitamin C is water-soluble.

Answer: (C)

Q18.

Solution

Concept:
Vegetable oils are unsaturated fats (containing double bonds). Hydrogenation converts these liquid oils into solid fats (like vanaspati ghee) by adding hydrogen across the double bonds.
Solution:
1. Reaction: Vegetable Oil + $H_2 \xrightarrow{\text{Catalyst}}$ Vegetable Ghee (Solid).
2. Catalyst: Finely divided Nickel (Ni) is used as a heterogeneous catalyst for this process.
3. Role: The catalyst provides a surface for the hydrogen and oil molecules to adsorb and react efficiently.
4. Temperature: The reaction is usually carried out at about 473 K.
Final Answer: The catalyst used is Nickel (Ni).

Answer: (B)

Q19.

Solution

Concept:

The geometry of a molecule is determined by the Valence Shell Electron Pair Repulsion (VSEPR) theory, which is based on the total number of bond pairs and lone pairs around the central atom.

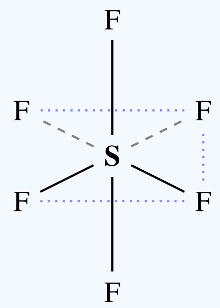
Solution:

1: The central atom is Sulphur (S), which has 6 valence electrons (Group 16).

2: There are 6 Fluorine (F) atoms bonded to the Sulphur. Each F atom forms a single bond using one electron from Sulphur.

3: Total electron pairs = 6 (all are bond pairs). Lone pairs = 0.

4: According to VSEPR theory, an AB_6 type molecule with 6 bond pairs and 0 lone pairs adopts an **Octahedral** geometry to minimize electron repulsion.



Octahedral Geometry (SF_6)

Final Answer:

Octahedral

Answer: (B)

Q20.

Solution

Concept:

Elastomers are polymers in which the polymer chains are held together by the weakest intermolecular forces. These weak forces permit the polymer to be stretched, and cross-links help the polymer retract to its original position.

Solution:

1. Nylon-6,6 and Terylene: These are fibers with strong intermolecular forces (hydrogen bonding or dipole-dipole).
2. Bakelite: This is a thermosetting plastic with extensive cross-linking.
3. Buna-S (Styrene-butadiene rubber): This is a synthetic rubber. Like natural rubber, it has elastic properties and belongs to the class of elastomers.
4. Other examples include Buna-N and Neoprene.

Final Answer: Buna-S is an example of an elastomer.

Answer: (C)

Q21.

Solution

Concept:

Proteins are macromolecules formed by the polymerization of amino acids. The linkage between amino acids is a specific covalent bond formed through a condensation reaction.

Solution:

1. **Reacting Groups:** Each amino acid contains a carboxyl group ($-COOH$) and an amino group ($-NH_2$).
2. **Condensation Reaction:** When two amino acids react, the $-COOH$ group of one combines with the $-NH_2$ group of another.
3. **Elimination of Water:** During this process, one molecule of water (H_2O) is removed.
4. **Bond Formation:** This results in the formation of an amide linkage: $-CO-NH-$.
5. **Specific Name:** In proteins, this amide bond is specifically called a **peptide linkage** or peptide bond.
6. **Comparison:** - Glycosidic linkage $\rightarrow$ present in carbohydrates - Phosphodiester linkage $\rightarrow$ present in nucleic acids

Final Answer: The linkage present in proteins is a Peptide linkage.

Answer: (B)

Q22.

Solution

Concept:
The magnetic moment of transition metal ions depends on the number of unpaired electrons, given by the spin-only formula:

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

Solution:
1. Mn^{2+}**:** Atomic number = 25 Electronic configuration: $[Ar]3d^5$ Number of unpaired electrons = 5
2. Fe^{2+}**:** Atomic number = 26 Electronic configuration: $[Ar]3d^6$ One pairing occurs ⇒ unpaired electrons = 4
3. Co^{2+}**:** Atomic number = 27 Electronic configuration: $[Ar]3d^7$ Two pairings occur ⇒ unpaired electrons = 3
4. **Comparison:**

$$Mn^{2+}(5) > Fe^{2+}(4) > Co^{2+}(3)$$

5. **Conclusion:** Greater number of unpaired electrons leads to a higher magnetic moment.

Final Answer: The order is $Mn^{2+} > Fe^{2+} > Co^{2+}$.

Answer: (A)

Q23.

Solution

Concept:
Greenhouse gases absorb infrared radiation due to changes in dipole moment during molecular vibrations.

Solution:
1. **Greenhouse Gases:** Molecules like CO_2, CH_4, N_2O, and O_3 can absorb infrared radiation and trap heat in the atmosphere.
2. **Condition for Absorption:** A molecule must undergo a change in dipole moment during vibration to absorb IR radiation.
3. **Homonuclear Diatomic Molecules:** N_2 and O_2 are symmetric molecules and do not show a change in dipole moment.
4. **Result:** These gases do not absorb infrared radiation and hence do not act as greenhouse gases.
5. **Conclusion:** Oxygen does not contribute to the greenhouse effect.

Final Answer: O_2 is not a greenhouse gas.

Answer: (C)

Q24.

Solution

Concept:
Different thermal processes are used in metallurgy to convert ores into suitable forms for extraction.

Solution:
1. **Calcination:** Heating the ore in the absence or limited supply of air. Used for carbonates and hydrated ores to convert them into oxides.
2. **Roasting:** Heating the ore in excess air. Mainly used for sulphide ores to convert them into oxides.
3. **Smelting:** Reduction of oxide ore into molten metal using a reducing agent.
4. **Identification:** The condition given (limited supply of air) corresponds to calcination.

Final Answer: The process is Calcination.

Answer: (B)

Q25.

Solution

Concept:
For a first-order reaction, the rate constant is related to half-life by:

$$k = \frac{0.693}{t_{1/2}}$$

Solution:
1. **Given:** $t_{1/2} = 69.3\ s$
2. **Substitute in formula:**

$$k = \frac{0.693}{69.3}$$

3. **Simplify:**

$$k = \frac{6.93 \times 10^{-1}}{6.93 \times 10^{1}}$$

4. **Final Calculation:**

$$k = 10^{-2}\ s^{-1}$$

5. **Conclusion:** The unit s^{-1} confirms first-order kinetics.

Final Answer: The rate constant is $10^{-2}\ s^{-1}$.

Answer: (A)

Q26.

Solution

Concept:
Magnetic behavior of molecules is explained using Molecular Orbital (MO) theory.
Solution:
1. N_2**:** Total electrons = 14 All electrons are paired ⇒ diamagnetic.
2. O_2**:** Total electrons = 16 Last two electrons occupy antibonding π^* orbitals singly.
3. **Unpaired Electrons:** Two unpaired electrons are present in O_2.
4. **Result:** Presence of unpaired electrons makes it paramagnetic.
5. **Other Molecules:** H_2 and CO_2 have all paired electrons ⇒ diamagnetic.
Final Answer: O_2 is a paramagnetic gas.

Answer: (B)

Q27.

Solution

Concept:
Second ionization enthalpy is very high when removal of the first electron results in a stable noble gas configuration.
Solution:
1. **Lithium** (Li)**:** Electronic configuration: $1s^2 2s^1$
2. **First Ionization:**

$$Li \to Li^+ + e^-$$

Resulting configuration: $1s^2$ (stable noble gas configuration)
3. **Second Ionization:** Removing an electron from $1s^2$ requires very high energy.
4. **Comparison with Beryllium** (Be)**:** Be^+ still has a $2s$ electron, so less energy is required compared to Li^+.
5. **Conclusion:** Lithium shows exceptionally high second ionization enthalpy.
Final Answer: Lithium (Li) has the highest second ionization enthalpy.

Answer: (A)

Q28.

Solution

Concept:

Point defects in solids, specifically stoichiometric defects. Schottky defect is a vacancy defect found in ionic solids where the electrical neutrality is maintained.

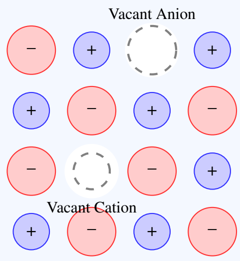
Solution:

1: A Schottky defect occurs when a specific number of ions are missing from their normal lattice sites.

2: To maintain the overall electrical neutrality of the crystal, the number of missing cations must be equal to the number of missing anions.

3: This defect is generally shown by highly ionic compounds with high coordination numbers and where the sizes of cations and anions are nearly similar (e.g., $NaCl, KCl, CsCl$).

4: Because atoms are leaving the lattice, the mass of the crystal decreases while the volume remains the same, leading to a decrease in the density of the crystal.



Schottky Defect (Equal vacancies)

Final Answer:

Equal number of cations and anions are missing.

Answer: (C)

Q29.

Solution

Concept:
Thermodynamic properties are classified into extensive and intensive properties based on whether they depend on the amount of substance present.

Solution:
1. **Extensive Properties:** These depend on the quantity of matter in the system. Examples include Mass, Volume, Internal Energy (U), Enthalpy (H), and Gibbs Free Energy (G).
2. **Intensive Properties:** These are independent of the amount of matter. Examples include Temperature, Pressure, Density, and Viscosity.
3. **Understanding Density:** Density is defined as:

$$\text{Density} = \frac{\text{Mass}}{\text{Volume}}$$

4. **Nature of Density:** Both mass and volume are extensive properties, but their ratio remains constant for a given substance.
5. **Conclusion:** Therefore, density does not change with the amount of substance and is an intensive property.

Final Answer: Density is an intensive property.

Answer: (C)

Q30.

Solution

Concept:
IUPAC naming of coordination compounds involves identifying the cation and anion, determining oxidation states, and naming ligands systematically.

Solution:
1. **Identify Components:** $K_3[Fe(CN)_6]$ consists of potassium ions (K^+) and the complex anion $[Fe(CN)_6]^{3-}$.
2. **Oxidation State of Fe:** Let oxidation state of Fe = x:

$$3(+1) + x + 6(-1) = 0$$

$$3 + x - 6 = 0 \Rightarrow x = +3$$

3. **Naming Ligands:** CN^- is called cyanide → "cyano". Six ligands → "hexa".
4. **Naming the Metal:** Since the complex is an anion, iron becomes "ferrate". Oxidation state is written as (III).
5. **Complete Name:** Potassium hexacyanoferrate(III).

Final Answer: Potassium hexacyanoferrate(III).

Answer: (B)

Q31.

Solution

Concept (Q31):
The selection of an indicator depends on the pH at the equivalence point of the titration.
Solution:
1. **Given Reaction:**

$$CH_3COOH + NaOH \rightarrow CH_3COONa + H_2O$$

2. **Nature of Reaction:** Weak acid + strong base titration.
3. **At Equivalence Point:** The salt (CH_3COONa) undergoes hydrolysis, making the solution basic.
4. **pH Range:** The equivalence point lies around $pH \approx 8 - 9$.
5. **Indicator Selection:** - Phenolphthalein changes color in range $8.3 - 10.0$ - Methyl orange changes in range $3.1 - 4.4$
6. **Conclusion:** Phenolphthalein is suitable as it changes color near the equivalence point.

Final Answer: (B) Phenolphthalein

Answer: (B)

Q32.

Solution

Concept (Q32):
The Etard reaction selectively oxidizes the methyl group of an aromatic compound to an aldehyde.
Solution:
1. **Reagent Used:** Chromyl chloride (CrO_2Cl_2) in non-aqueous solvent like CS_2 or CCl_4.
2. **Intermediate Formation:** A brown chromium complex is formed during the reaction.
3. **Hydrolysis Step:** On hydrolysis, the complex breaks down to give benzaldehyde.
4. **Selectivity:** The reaction stops at aldehyde stage and prevents further oxidation to carboxylic acid.

Final Answer: (A) CrO_2Cl_2

Answer: (A)

Q33.

Solution

Concept (Q33):
Sucrose is a disaccharide composed of two monosaccharides linked by a glycosidic bond.
Solution:
1. **Composition:** Sucrose consists of α-D-Glucose and β-D-Fructose.
2. **Hydrolysis:** On hydrolysis (using acid or enzyme invertase), the glycosidic bond breaks.
3. **Products Formed:** One molecule of glucose and one molecule of fructose are produced.
4. **Special Note:** The process is called inversion because the optical rotation changes sign.

Final Answer: (C) One Glucose and one Fructose

Answer: (C)

Q34.

Solution

Concept (Q34):
The $+I$ (inductive) effect is the electron-donating effect of alkyl groups, which increases with branching.
Solution:
1. **Methyl Group ($-CH_3$):** Weakest $+I$ effect.
2. **Isopropyl Group ($-CH(CH_3)_2$):** Two alkyl groups donate electron density.
3. **tert-Butyl Group ($-C(CH_3)_3$):** Three alkyl groups attached to the same carbon increase electron donation significantly.
4. **Trend:** More branching $\Rightarrow$ stronger $+I$ effect.
5. **Conclusion:** tert-Butyl group shows maximum $+I$ effect.

Final Answer: (D) $-C(CH_3)_3$

Answer: (D)

Q35.

Solution

Concept (Q35):
Industrial chemical accidents can involve the release of highly toxic intermediates used in pesticide manufacturing.
Solution:
1. **Chemical Involved:** Methyl isocyanate (MIC), formula: CH_3NCO.
2. **Properties:** Highly volatile and extremely toxic.
3. **Cause of Accident:** Reaction of MIC with water led to a rapid exothermic reaction and pressure buildup.
4. **Result:** Large-scale release of toxic gas into the atmosphere.

Final Answer: (A) Methyl isocyanate

Answer: (A)

Q36.

Solution

Concept:
The number of lone pairs on a central atom is determined by the Valence Shell Electron Pair Repulsion (VSEPR) theory using the valence electrons and the number of bonded atoms.

Solution:
1: Identify the central atom. In XeF_2, the central atom is Xenon (Xe). Xenon is a noble gas and has 8 valence electrons.
2: Identify the number of bonding atoms. There are 2 Fluorine (F) atoms. Each Fluorine forms a single bond, using 1 electron from Xenon.
3: Calculate the number of electrons involved in bonding.

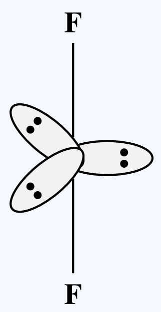
$$\text{Bonding electrons} = 2$$

4: Calculate the remaining non-bonding electrons and lone pairs:

$$\text{Remaining electrons} = 8 - 2 = 6$$

$$\text{Number of Lone Pairs} = \frac{6}{2} = 3$$

5: According to VSEPR theory, for a total of 5 electron pairs (2 bond pairs + 3 lone pairs), the electron geometry is trigonal bipyramidal, but the molecular shape is linear as the 3 lone pairs occupy the equatorial positions.



Linear Geometry with 3 Lone Pairs

Final Answer:

$$\boxed{3}$$

Answer: (C)

Q37.

Solution

Concept:
Drugs are classified based on their therapeutic action. Antidepressants act on the central nervous system by modifying neurotransmitter levels.
Solution:
1. **Aspirin:** Acts as an analgesic (pain reliever) and antipyretic (reduces fever).
2. **Penicillin:** An antibiotic used to treat bacterial infections.
3. **Chloramphenicol:** A broad-spectrum antibiotic effective against a wide range of bacteria.
4. **Iproniazid:** - Belongs to the class of antidepressant drugs. - It inhibits monoamine oxidase (MAO), an enzyme responsible for the breakdown of neurotransmitters like noradrenaline. - Increased levels of these neurotransmitters help improve mood.
5. **Conclusion:** Only Iproniazid functions as an antidepressant.

Final Answer: Iproniazid is an antidepressant drug.

Answer: (A)

Q38.

Solution

Concept:
The solubility product constant (K_{sp}) depends on the equilibrium concentrations of ions formed upon dissociation of a sparingly soluble salt.
Solution:
1. **Dissociation Equation:**

$$Ag_2CrO_4(s) \rightleftharpoons 2Ag^+(aq) + CrO_4^{2-}(aq)$$

2. **Assume Solubility = S:** Let the molar solubility of Ag_2CrO_4 be S mol/L.
3. **Ion Concentrations:**

$$[Ag^+] = 2S, \quad [CrO_4^{2-}] = S$$

4. **Expression for K_{sp}:**

$$K_{sp} = [Ag^+]^2[CrO_4^{2-}]$$

5. **Substitute Values:**

$$K_{sp} = (2S)^2 \cdot (S)$$

6. **Simplify:**

$$K_{sp} = 4S^2 \cdot S = 4S^3$$

Final Answer: $K_{sp} = 4S^3$

Answer: (B)

Q39.

Solution

Concept:
Batteries are classified into primary (non-rechargeable) and secondary (rechargeable) based on reversibility of chemical reactions.

Solution:
1. **Primary Batteries:** - Chemical reactions are irreversible. - Cannot be recharged after use.
2. **Secondary Batteries:** - Reactions are reversible. - Can be recharged multiple times.
3. **Examples of Secondary Batteries:** Lead storage battery, Nickel-cadmium battery, Lithium-ion battery.
4. **Mercury Cell:** - Used in devices like watches and hearing aids. - The chemical reactions are not reversible.
5. **Conclusion:** Hence, mercury cell is a primary battery.

Final Answer: Mercury cell is a primary battery.

Answer: (B)

Q40.

Solution

Concept:
Molarity is defined as the number of moles of solute per liter of solution.

Solution:
1. **Given Data:** Mass of $NaOH = 4.0\ g$ Volume of solution = 500 mL
2. **Molar Mass of $NaOH$:**

$$23 + 16 + 1 = 40\ g/mol$$

3. **Number of Moles:**

$$\frac{4}{40} = 0.1\ mol$$

4. **Convert Volume to Liters:**

$$500\ mL = 0.5\ L$$

5. **Calculate Molarity:**

$$M = \frac{0.1}{0.5} = 0.2\ M$$

Final Answer: The molarity is 0.2 M.

Answer: (B)

Q41.

Solution

Concept:
Boiling point depends on the strength of intermolecular forces. Hydrogen bonding is stronger than van der Waals forces.

Solution:

1. **Electronegativity Difference:** Oxygen is more electronegative than sulphur.
2. **Hydrogen Bonding in H_2O:** Strong intermolecular hydrogen bonds are present.
3. **Forces in H_2S:** Only weak van der Waals forces exist.
4. **Energy Requirement:** More energy is needed to break hydrogen bonds.
5. **Conclusion:** Hence, H_2O has a much higher boiling point.

Final Answer: The higher boiling point is due to Hydrogen bonding.

Answer: (B)

Q42.

Solution

Concept:
Optical activity arises due to the presence of a chiral carbon atom bonded to four different groups.

Solution:

1. **2-Chloropropane:** Central carbon is attached to two identical CH_3 groups $\Rightarrow$ achiral.
2. **2-Chlorobutane:** The second carbon is attached to: $-H$, $-Cl$, $-CH_3$, $-C_2H_5$ (all different).
3. **Chirality:** Presence of four different groups makes it a chiral center.
4. **1-Chlorobutane:** Contains no chiral carbon.
5. **Conclusion:** Only 2-chlorobutane is optically active.

Final Answer: 2-Chlorobutane is optically active.

Answer: (B)

Q43.

Solution

Concept:
Polymers are long-chain molecules formed by the repetition of monomer units.
Solution:
1. **Polymer:** PVC (Polyvinyl chloride).
2. **Monomer:** Vinyl chloride ($CH_2 = CHCl$).
3. **Polymerization Process:** Addition polymerization occurs:

$$n(CH_2 = CHCl) \rightarrow [-CH_2 - CHCl-]_n$$

4. **Properties and Uses:** PVC is durable and widely used in pipes, insulation, and plastic products.

Final Answer: The monomer is Vinyl chloride.

Answer: (B)

Q44.

Solution

Concept:
Neutral oxides neither react with acids nor bases to form salts.
Solution:
1. **Acidic Oxides:** SO_2, CO_2, P_2O_5 form acids in water.
2. **Neutral Oxides:** Examples include CO, NO, and N_2O.
3. **Behavior of N_2O:** Does not react with acids or bases.
4. **Conclusion:** Hence, N_2O is a neutral oxide.

Final Answer: N_2O is a neutral oxide.

Answer: (B)

Q45.

Solution

Concept:
Osmotic pressure is directly proportional to concentration and temperature as per Van't Hoff equation.

Solution:

1. **Formula:**
$$\pi = CRT$$
2. **Dependence:** $\pi \propto C$ and $\pi \propto T$
3. **Effect of Volume:** Increasing volume decreases concentration $\Rightarrow$ decreases π.
4. **Effect of Temperature:** Increasing temperature increases osmotic pressure.
5. **Conclusion:** Temperature increase leads to higher osmotic pressure.

Final Answer: Osmotic pressure increases with increasing temperature.

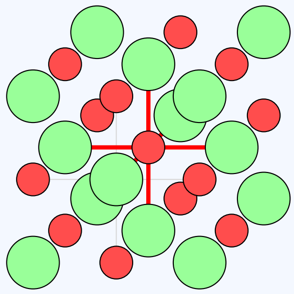
Answer: (B)

Q46.

Solution

Concept:
The coordination number in an ionic crystal is the number of ions of opposite charge that surround a specific ion as its nearest neighbors.

Solution:
1: Sodium chloride ($NaCl$) crystallizes in a face-centered cubic (fcc) or rock-salt structure.
2: In this lattice, the Cl^- ions (larger ions) form a cubic close-packed (ccp) arrangement, and the Na^+ ions (smaller ions) occupy all the octahedral voids.
3: Each Cl^- ion is surrounded by 6 Na^+ ions located at the centers of the octahedral voids. Conversely, each Na^+ ion is surrounded by 6 Cl^- ions.
4: Therefore, the coordination geometry for both ions is octahedral, giving a coordination ratio of 6:6.



NaCl Octahedral Coordination (CN = 6)

Final Answer:

$$\boxed{6}$$

Answer: (B)

Q47.

Solution

Concept: The reaction of Grignard reagents ($RMgX$) with carbonyl compounds is a standard method for synthesizing alcohols. The type of alcohol (primary, secondary, or tertiary) depends on the starting aldehyde or ketone.

Solution: 1. **Reactants:** Formaldehyde ($HCHO$) and Methyl magnesium bromide (CH_3MgBr). 2. **1 (Addition):** The nucleophilic methyl group attacks the carbonyl carbon:

$$HCHO + CH_3MgBr \rightarrow CH_3 - CH_2 - OMgBr$$

3. **2 (Hydrolysis):** Adding water breaks the Mg complex:

$$CH_3 - CH_2 - OMgBr + H_2O \rightarrow CH_3 - CH_2 - OH + Mg(OH)Br$$

4. **Product:** The resulting molecule is Ethanol, a primary alcohol. 5. **Note:** Other aldehydes give secondary alcohols, and ketones give tertiary alcohols.

Final Answer: The product is Ethanol.

Answer: (B)

Q48.

Solution

Concept: Natural rubber is soft, sticky, and has low tensile strength. Vulcanization is a process used to improve these physical properties by creating cross-links between polymer chains.

Solution: 1. **Process:** Natural rubber is heated with raw Sulphur and appropriate additives at a temperature range of 373 K to 415 K. 2. **Chemistry:** Sulphur forms "bridges" or cross-links at the reactive sites (double bonds) of the polyisoprene chains. 3. **Effect:** These cross-links make the rubber harder, stronger, and more resistant to temperature changes and oxidation. 4. **Application:** Vulcanized rubber is essential for making vehicle tires.

Final Answer: Sulphur is used in vulcanization.

Answer: (B)

Q49.

Solution

Concept: The pH of an acidic buffer solution is determined by the Henderson-Hasselbalch equation:

$$pH = pK_a + \log \frac{[\text{Salt}]}{[\text{Acid}]}$$

Solution: 1. **Condition:** The problem states that the concentration of the weak acid is equal to the concentration of its conjugate base (salt). 2. **Substitution:** If [Salt] = [Acid], then the ratio $\frac{[\text{Salt}]}{[\text{Acid}]} = 1$. 3. **Calculation:**

$$pH = pK_a + \log(1)$$

Since $\log(1) = 0$, the equation simplifies to:

$$pH = pK_a$$

4. **Significance:** At this point, the buffer is at its maximum buffering capacity.

Final Answer: The pH is equal to pK_a.

Answer: (B)

Q50.

Solution

Concept:

Organic reactions are classified based on how reactants interact—particularly whether a species donates or accepts electrons and whether a group is replaced, added, or eliminated.

Solution:

1. **Given Reactant:** Ethyl iodide (CH_3CH_2I) is an alkyl halide. The $C - I$ bond is polar because iodine is more electronegative, making carbon partially positive (electrophilic).

2. **Reagent Used:** Aqueous KOH dissociates to give K^+ and OH^-. The hydroxide ion (OH^-) is a strong nucleophile due to its negative charge and lone pairs of electrons.

3. **Nature of Attack:** The nucleophile (OH^-) is attracted to the electrophilic carbon atom of ethyl iodide.

4. **Mechanism:** - The OH^- attacks the carbon from the backside. - Simultaneously, the $C - I$ bond breaks and I^- leaves. - This occurs in a single step (concerted mechanism).

5. **Type of Reaction:** Since a nucleophile replaces a leaving group (I^-), the reaction is a substitution reaction.

6. **Specific Mechanism:** Because ethyl iodide is a primary alkyl halide, the reaction follows the S_N2 mechanism (bimolecular nucleophilic substitution).

7. **Conclusion:** The reaction is classified based on substitution by a nucleophile.

Final Answer: This is an example of Nucleophilic substitution.

Answer: (B)

Answer Key

Q	Ans	Q	Ans	Q	Ans	Q	Ans	Q	Ans
1	B	2	B	3	C	4	A	5	C
6	B	7	C	8	C	9	A	10	C
11	C	12	A	13	D	14	B	15	C
16	B	17	C	18	B	19	B	20	C
21	B	22	A	23	C	24	B	25	A
26	B	27	A	28	C	29	C	30	B
31	B	32	A	33	C	34	D	35	A
36	C	37	A	38	B	39	B	40	B
41	B	42	B	43	B	44	B	45	B
46	B	47	B	48	B	49	B	50	B