

ISC Class 12 • Chemistry

Important Questions 2027

Most repeated questions from the last few years of board and sample papers, grouped chapter-wise.

Solutions

1. The correct order of freezing point of 0.5 M solution of urea, AlCl_3 , KCl and MgCl_2 is: (a) $\text{AlCl}_3 > \text{MgCl}_2 > \text{KCl} > \text{urea}$ (b) $\text{Urea} > \text{KCl} > \text{MgCl}_2 > \text{AlCl}_3$ (c) $\text{MgCl}_2 > \text{KCl} > \text{AlCl}_3 > \text{urea}$ (d) $\text{KCl} > \text{MgCl}_2 > \text{AlCl}_3 > \text{urea}$

Seen in: Sample 2024, 2027

2. (i) Calculate the mass of ascorbic acid (molecular mass = 176 g mol^{-1}) to be dissolved in 75 g of acetic acid to lower its freezing point by 1.5°C . Assume the solute neither associates nor dissociates. (K_f for acetic acid = $3.9 \text{ K kg mol}^{-1}$) (ii) A solution of an organic compound was prepared by dissolving 6.8 g in 0.1 litre of water. Calculate the osmotic pressure of this solution at 25°C . (Molecular mass = $321.45 \text{ g mol}^{-1}$) (iii) Why are aquatic species more comfortable in cold water than warm water?

Seen in: Board 2023, 2026 · Sample 2024, 2026

3. (i)(a) 300 ml of aqueous solution of protein contains 1.85 g of protein, the osmotic pressure at 25°C is $3.05 \times 10^{-3} \text{ atm}$. Calculate the molar mass of the protein. (b) Phenol ($\text{C}_6\text{H}_5\text{OH}$) associates in benzene to form a dimer. A solution of 2.5 g of phenol in 120 g of benzene lowers its freezing point by 0.85 K . Calculate the degree of association of phenol. (K_f benzene = $5.12 \text{ K kg mol}^{-1}$, molecular mass of phenol = 94) (c) The molecular weight of potassium chloride and sucrose is determined by the depression of freezing point method. Compared to their theoretical molecular weight, what will be their observed molecular weights? Justify.

Seen in: Board 2023 · Sample 2026, 2027

4. Assertion: The depression of freezing point of 0.1 molal aqueous solution of MgCl_2 is less than that of 0.1 molal aqueous solution of NaCl. Reason: The number of particles furnished by 0.1 molal MgCl_2 is less than that of 0.1 molal NaCl. (a) Both A and R true, R correct explanation (b) Both true, R not correct explanation (c) A true, R false (d) Both false

Seen in: Board 2026 · Sample 2026

5. OR (ii)(a) Calculate the boiling point of urea solution when 8.0 g of urea is dissolved in 250 g of water. Boiling point of pure water is 373 K . (k_b of water = $0.52 \text{ K kg mol}^{-1}$, molecular mass of urea = 60 g mol^{-1})

Seen in: Sample 2024, 2025

6. (i) 0.680 g of a compound is dissolved in 15 g of benzene and the freezing point of solution is lowered by 1.44 degC. Calculate the experimental molecular mass of the compound. (K_f for benzene = $5.12 \text{ K kg mol}^{-1}$) (ii) If the theoretical molecular mass of the compound is 80.5 g mol^{-1} , suggest whether it is undergoing association or dissociation.

Seen in: Board 2026 · Sample 2025

7. Passage on osmosis (osmotic pressure of human blood 8.21 atm at 27 degC; 0.91% saline isotonic). (a) What is an isotonic solution? (b) How much glucose should be used per 100 ml (aqueous solution) for intravenous injection isotonic with blood at 27 degC? (c) What would be the osmotic pressure of blood if the temperature is 37 degC? (d) A pure NaCl solution with salt concentration less than 0.91% (mass/volume) is hypertonic to human blood. Is this statement true or false? Give a reason. (e) Name the disease caused by taking a lot of salt or salty food, which results in water retention in tissue cells causing puffiness or swelling.

Seen in: Board 2023 · Sample 2025

8. If 200 cm^3 of an aqueous solution of a protein contains 1.26 g of protein, the osmotic pressure of the solution at 300 K is found to be $2.57 \times 10^{-3} \text{ atm}$. Calculate the molar mass of protein. ($R = 0.0821 \text{ L atm K}^{-1} \text{ mol}^{-1}$)

Seen in: Board 2024 · Sample 2023

9. An aqueous solution containing 12.50 g of barium chloride in 1000 g of water boils at 373.0834 K. Calculate the degree of dissociation of barium chloride. Given K_b for $\text{H}_2\text{O} = 0.52 \text{ K kg mol}^{-1}$; molecular mass of $\text{BaCl}_2 = 208.34 \text{ g mol}^{-1}$.

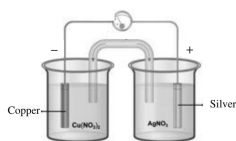
Seen in: Board 2024 · Sample 2023

Electrochemistry

10. Passage: Vishal measured resistance of aqueous KCl at 298 K and calculated conductivity (κ) and molar conductivity (Λ_m^0) for various concentrations (data table given). Why did the molar conductivity increase though the conductivity decreased with dilution?

Seen in: Board 2024, 2025 · Sample 2023, 2025, 2026

11. (i)(a) Cu-Ag electrochemical cell (Copper in $\text{Cu}(\text{NO}_3)_2$, Silver in AgNO_3). Given $E^0_{(\text{Cu}^{2+}/\text{Cu})} = 0.337 \text{ V}$; $E^0_{(\text{Ag}^+/\text{Ag})} = 0.799 \text{ V}$. (1) Write the cell reaction. (2) Calculate the standard emf of the cell. (3) If $[\text{Cu}^{2+}]$ is 0.1 M and E_{cell} is 0.422 V at 25 degC, calculate $[\text{Ag}^+]$. (4) Calculate ΔG for the cell. (b) Calculate molar conductivity (Λ_m^0) for BaCl_2 and $\text{Al}_2(\text{SO}_4)_3$ from the data: $\Lambda_m^0 \text{ Ba}^{2+} = 127.2$, $\Lambda_m^0 \text{ Cl}^- = 76.3$, $\Lambda_m^0 \text{ Al}^{3+} = 189$, $\Lambda_m^0 \text{ SO}_4^{2-} = 160 \text{ S cm}^2 \text{ mol}^{-1}$.



Seen in: Board 2024 · Sample 2024, 2025, 2026

12. OR The molar conductivities at infinite dilution for NaI, CH_3COONa and $(\text{CH}_3\text{COO})_2\text{Mg}$ are 126.9, 91.0 and $187.8 \text{ ohm}^{-1} \text{ cm}^2 \text{ mol}^{-1}$ respectively at 25 degC. Find out the molar conductivity of MgI_2 at infinite dilution by using Kohlrausch's law of independent migration of ions.

Seen in: Board 2026 · Sample 2026, 2027

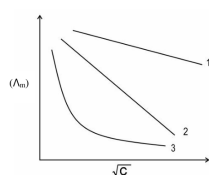
13. Write the Nernst equation and calculate the emf of the following cell at 298 K: $\text{Mg(s)} / \text{Mg}^{2+}(1 \times 10^{-3} \text{ M}) // \text{Cu}^{2+}(1 \times 10^{-4} \text{ M}) / \text{Cu(s)}$. Given $E^\circ_{\text{Mg}^{2+}/\text{Mg}} = -2.373 \text{ V}$, $E^\circ_{\text{Cu}^{2+}/\text{Cu}} = +0.337 \text{ V}$.

Seen in: Board 2023, 2025 · Sample 2023, 2027

14. Calculate the value of ΔG^0 for the following cell at 25 degC. $\text{Zn(s)} / \text{Zn}^{2+}(1 \text{ M}) // \text{Sn}^{2+}(1 \text{ M}) / \text{Sn(s)}$. Given $E^\circ_{\text{Zn}^{2+}/\text{Zn}} = -0.76 \text{ V}$, $E^\circ_{\text{Sn}^{2+}/\text{Sn}} = -0.14 \text{ V}$, 1 Faraday = 96500 coulombs.

Seen in: Board 2023, 2024, 2026 · Sample 2023

15. OR (ii)(a) The molar conductivity vs $\sqrt{C}$ curves for Na_2SO_4 , H_2SO_4 and NH_4OH are shown in random order (curves 1, 2, 3). Identify the curve corresponding to each and justify. (b) The molar conductivity (Λ_m) of a dilute solution of methanoic acid is $34.1 \text{ S cm}^2/\text{mol}$. Calculate its degree of dissociation. (Given $\lambda^\circ(\text{H}^+) = 349.6 \text{ S cm}^2/\text{mol}$ and $\lambda^\circ(\text{HCOO}^-) = 54.6 \text{ S cm}^2/\text{mol}$)

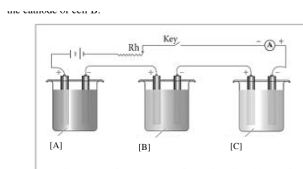


Seen in: Board 2023, 2026 · Sample 2024

16. OR (ii)(a) When a current of 0.75 ampere is passed through a CuSO_4 solution for 25 minutes, 0.370 g of copper is deposited. Calculate the atomic weight of copper. (b) Two metals A and B have standard reduction potential values -0.76 V and $+0.34 \text{ V}$ respectively. Which of these metals will liberate H_2 gas from dil. H_2SO_4 ? Why? (c) Why does the specific conductivity (κ) of a solution decrease on dilution?

Seen in: Board 2026 · Sample 2026

17. OR (ii)(a) A 0.05 M NH_4OH solution offers a resistance of 30.8 ohms to a conductivity cell at 298 K. If the cell constant is 0.343 cm^{-1} and molar conductance of NH_4OH at infinite dilution is $471.4 \text{ S cm}^2 \text{ mol}^{-1}$, calculate (1) Specific conductance (2) Molar conductance (3) Degree of dissociation. (b) An electrolytic cell with A, B and C connected in series having electrolytes ZnSO_4 , AgNO_3 and CuSO_4 respectively. A steady current of 1.5 A was passed until 1.45 g of Ag was deposited at cathode of cell B. (Atomic mass $\text{Ag}=108$, $\text{Cu}=63.5$, $\text{Zn}=65.3$) (1) How long did the current flow? (2) What weight of Cu and Zn was deposited at cathode?



Seen in: Board 2024 · Sample 2027

- 18.** The solutions of two electrolytes A and B are diluted. Λ_m of B increases 1.5 times while that of A increases 25 times. Which of the two is a strong electrolyte? Give a reason.

Seen in: Sample 2024, 2025

- 19.** Answer the following: (a) By referring to electrochemical series, how can anode and cathode half cells be identified in a galvanic cell? (b) What is the role of salt bridge in a galvanic cell? (c) Write an advantage and a disadvantage of a fuel cell.

Seen in: Board 2025 · Sample 2025

- 20.** (i) Dry cells are commonly used in clocks, torches, calculators etc. (a) What acts as anode and cathode in dry cell? (b) Which chemical compounds are filled between anode and cathode of this cell? (c) Why do dry cells not have a long life?

Seen in: Board 2024 · Sample 2025

- 21.** Calculate the number of coulombs required to electroplate 4.75 g of aluminium when electrode reaction is $\text{Al}^{3+} + 3\text{e}^- \rightarrow \text{Al}$. (Given: Atomic weight of Al = 27 g mol^{-1} , 1 Faraday = 96500 coulombs)

Seen in: Board 2025 · Sample 2023

Chemical Kinetics

- 22.** Data for hypothetical reaction $2\text{A} + \text{B} \rightarrow 2\text{AB}$: Exp 1: $[\text{A}]=0.5$, $[\text{B}]=0.5$, $\text{rate}=1.8 \times 10^{-4}$; Exp 2: $[\text{A}]=1.0$, $[\text{B}]=0.5$, $\text{rate}=3.6 \times 10^{-4}$; Exp 3: $[\text{A}]=1.0$, $[\text{B}]=1.0$, $\text{rate}=3.6 \times 10^{-4} \text{ (mol L}^{-1} \text{ sec}^{-1})$. The rate law expression is: (a) $\text{rate}=k[\text{A}]^1[\text{B}]^1$ (b) $\text{rate}=k[\text{A}]^1[\text{B}]^0$ (c) $\text{rate}=k[\text{A}]^2[\text{B}]^1$ (d) $\text{rate}=k[\text{A}]^0[\text{B}]^1$

Seen in: Board 2024, 2025 · Sample 2024, 2025, 2027

- 23.** In general, the rate of a reaction becomes double with every 10°C rise in temperature. If this generalisation holds true, calculate the value of activation energy when temperature changes from 295 K to 305 K.

Seen in: Sample 2025, 2026, 2027

- 24.** A first order reaction is 40% complete in 20 minutes. Calculate the time required for 90% completion of the same reaction.

Seen in: Board 2023, 2026 · Sample 2025, 2026

- 25.** A reaction is of first order with respect to reactant [A] and second order with regard to reactant [B]. What is the effect on rate of reaction when: (i) concentration of only [B] is increased three times? (ii) concentration of both [A] and [B] is doubled?

Seen in: Board 2025, 2026 · Sample 2026

26. (i) The unit of rate constant of a reaction is same as that of its rate of reaction. Find the order of this reaction. (ii) Give one example of pseudo first order reaction. (iii) How will the rate of reaction be affected when the surface area of the reactant is reduced?

Seen in: Board 2024, 2025 · Sample 2026

27. (i) The rate constant of a first order reaction increases five times when the temperature is raised from 350 K to 500 K. Calculate the activation energy of the reaction. ($R = 8.314 \text{ JK}^{-1}\text{mol}^{-1}$) (ii) The unit of rate constant of a reaction is same as that of its rate of reaction. What is the order of this reaction?

Seen in: Board 2023, 2026 · Sample 2023

28. Rohan, a patient of thyroid disorder, was given radioactive Iodine-131 as part of his treatment. What amount of Iodine-131 will be left in Rohan's body after 48 days, if the half-life period of radioactive iodine-131 is 12 days? Assume no amount of the isotope was eliminated through biological processes.

Seen in: Board 2024 · Sample 2027

29. Passage on C-14 dating. In a piece of dead wood, the activity or concentration of C-14 is found to be one third of its initial activity. Calculate the age of the old wood.

Seen in: Sample 2024, 2025

30. Fill in the blank: The hydrolysis of ethyl acetate in acidic medium is a pseudo _____ order reaction. However, the molecularity of the reaction is _____.

Seen in: Board 2025, 2026

31. For a first order reaction, the half-life period ($t_{1/2}$) is: (a) proportional to the initial concentration. (b) inversely proportional to the initial concentration. (c) proportional to the square root of the initial concentration. (d) independent of the initial concentration.

Seen in: Board 2023 · Sample 2023

d- and f-Block Elements

32. (i) Complete and balance the following chemical equation: $\text{KMnO}_4 + \text{H}_2\text{SO}_4 + \text{H}_2\text{S} \rightarrow$ (ii) Why do transition metals form alloys? (iii) Potassium dichromate ($\text{K}_2\text{Cr}_2\text{O}_7$) acts as a powerful oxidising agent in acidic medium. Explain.

Seen in: Board 2023, 2025, 2026 · Sample 2023, 2025, 2026, 2027

33. Assertion: The Zr-Hf pair of elements has the same value of atomic radii though Zr and Hf are placed in different periods in the periodic table. Reason: The lanthanoid contraction prevents the expected increase in atomic radii of Hf. (a) Both A and R true, R correct explanation (b) Both true, R not correct explanation (c) A true, R false (d) Both false

Seen in: Board 2023, 2024, 2025 · Sample 2024, 2025

34. Fill in the blank: The colour of transition metal ions is due to _____ electron(s) in d-subshell and _____ transition.

Seen in: Board 2025 · Sample 2024, 2027

35. Substantiate the following statements with reasons: (i) Cobalt is attracted in a magnetic field whereas Zinc is not. (Co=27, Zn=30) (ii) The melting points and boiling points of Zn, Cd and Hg are low. (Zn=30, Cd=48, Hg=80)

Seen in: Sample 2026, 2027

36. When H_2S gas is passed through acidified $\text{K}_2\text{Cr}_2\text{O}_7$ solution, the colour of the solution changes to: (a) green (b) orange (c) black (d) red

Seen in: Board 2024, 2026 · Sample 2024

37. Give a reason for each of the following: (i) Zinc, cadmium and mercury are considered as d-block elements but not regarded as transition elements. (ii) Transition metals possess a great tendency to form complex compounds.

Seen in: Board 2024 · Sample 2023, 2024

38. Fill in the blank: The variation and magnitude of oxidation state in coordination complexes is due to the participation of inner _____ electrons in addition to outer _____ electrons.

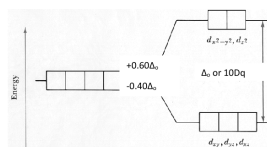
Seen in: Sample 2023, 2025

Coordination Compounds

39. Answer the following with respect to the coordination complex ion $[\text{Cr}(\text{NH}_3)_6]^{3+}$: (a) What is the hybridisation state of the central metal atom? (b) Comment on the magnetic nature of the complex ion.

Seen in: Board 2026 · Sample 2023, 2024, 2025, 2026, 2027

40. OR Observe the diagram of splitting of d-orbital in octahedral field (e_g at $+0.60 \Delta_o$, t_{2g} at $-0.40 \Delta_o$). (a) Identify the electronic configuration of d^5 ion, if $\Delta_o < P$. (b) Comment on the relationship between crystal field stabilisation energy (Δ_o) and the strength of the ligand.



Seen in: Board 2025, 2026 · Sample 2024, 2025, 2026, 2027

41. The sum of coordination number and oxidation number of metal 'M' in the complex $[\text{M}(\text{en})_2\text{Cl}_2]$ is: (a) 6 (b) 8 (c) 9 (d) 10

Seen in: Board 2023, 2025 · Sample 2025, 2026

42. Cobalt (III) chloride forms several octahedral complexes with ammonia. Which will NOT give a test for chloride ions with silver nitrate solution at 25 degC? (a) $\text{CoCl}_3 \cdot 6\text{NH}_3$ (b) $\text{CoCl}_3 \cdot 5\text{NH}_3$ (c) $\text{CoCl}_3 \cdot 4\text{NH}_3$ (d) $\text{CoCl}_3 \cdot 3\text{NH}_3$

Seen in: Board 2025 · Sample 2024, 2027

43. (i) The compound $[\text{PtCl}_2(\text{NH}_3)_2]$ known as cis-platin is used in chemotherapy. (a) Write its IUPAC name and the type of isomerism it exhibits. (b) What is the geometry of the compound? (ii) What type of structural isomers are $[\text{Pt}(\text{NH}_3)_3\text{Br}]\text{NO}_3$ and $[\text{Pt}(\text{NH}_3)_3(\text{NO}_3)]\text{Br}$? How can they be distinguished by a chemical test? (iii) A coordination compound $\text{CoCl}_3 \cdot 4\text{H}_2\text{O}$ precipitates silver chloride when treated with silver nitrate. The molar conductance of its solution corresponds to a total of two ions. Write the structural formula of the compound and name it.

Seen in: Board 2023, 2024 · Sample 2027

44. Write the IUPAC names of the following complex compounds: (i) $[\text{Pt}(\text{NH}_3)_3\text{Cl}_2]\text{SO}_4$ (ii) $\text{K}_2[\text{Ni}(\text{CN})_4]$

Seen in: Board 2026 · Sample 2026

45. Which one of the following is a tetrahedral complex as well as diamagnetic in nature? (a) $[\text{Ni}(\text{CN})_4]^{2-}$ (b) $[\text{NiCl}_4]^{2-}$ (c) $[\text{Cu}(\text{NH}_3)_4]^{2+}$ (d) $[\text{Ni}(\text{CO})_4]$

Seen in: Board 2024, 2026

Haloalkanes and Haloarenes

46. Rehan and Ananya were given the same alkyl halide ($\text{C}_{25}\text{H}_{51}\text{Cl}$). Rehan used alcoholic KCN and Ananya used alcoholic AgCN. Rehan's compound could be converted to a carboxylic acid on hydrolysis but Ananya could not obtain the same acid, due to the bonding behaviour of cyanide ions. Write the chemical equations of the reactions and the IUPAC names of the compounds formed by Rehan and Ananya.

Seen in: Board 2026 · Sample 2026, 2027

47. When Chlorobenzene is heated with aq. ammonia in the presence of Cu_2O at high pressure, it gives: (a) aniline (b) phenyl isocyanide (c) diphenyl (d) diphenylamine

Seen in: Board 2023 · Sample 2026

48. Assertion: The process of halogenation of benzene takes place in the presence of anhydrous FeCl_3 . Reason: Anhydrous FeCl_3 prepares nucleophile to attack the benzene ring. (a) Both A and R true, R correct explanation (b) Both true, R not correct explanation (c) A true, R false (d) Both false

Seen in: Board 2025 · Sample 2023

49. Write chemical equations to convert each of the following: (i) Chlorobenzene to aniline (ii) Iodoform to acetylene

Seen in: Board 2024, 2026

50. Two compounds, D-2-chlorobutane and L-2-chlorobutane, are enantiomers of each other. Name one physical property that is: (i) same for D-2-chlorobutane and L-2-chlorobutane. (ii) different for D-2-chlorobutane and L-2-chlorobutane.

Seen in: Board 2023 · Sample 2024

Alcohols, Phenols and Ethers

51. Assertion: When an ether containing a primary alkyl group and tertiary alkyl group is treated with hydrogen iodide, tertiary alkyl iodide is formed. Reason: The reaction takes place via S_N1 mechanism, and the more stable tertiary carbocation is formed easily which combines with iodide ion to form tertiary alkyl iodide. (a) Both true, R correct explanation (b) Both true, R not correct explanation (c) A true, R false (d) Both false

Seen in: Board 2024 · Sample 2025, 2026, 2027

52. OR How will the following be converted? (Give chemical equations) (a) Diethyl ether from sodium ethoxide (b) Propan-2-ol from Grignard's reagent (c) Phenol from Cumene

Seen in: Board 2024, 2026 · Sample 2026, 2027

53. Passage on alcohols and phenols. Although alcohols are weaker acids than water, phenol is more acidic than alcohols. Justify.

Seen in: Board 2025, 2026 · Sample 2027

54. Passage on phenol (used to prepare picric acid, plastics; less soluble in water than aliphatic alcohol). (i) How is the acid (picric acid) prepared from phenol? Write the chemical reaction. (ii) 'Phenol is less soluble in water as compared to aliphatic alcohol.' Explain. (iii) Write the chemical equation for the preparation of phenol from chlorobenzene. (iv) An organic compound [A] $C_{4H_{10}O}$ gives positive Lucas test within five minutes at room temperature. [A] upon oxidation with $K_2Cr_2O_7/H_2SO_4$ forms [B] which does not respond to Tollen's test. Identify compounds [A] and [B]. (v) In the above reaction, [B] gets reduced with Zn/Hg and HCl and forms [C]. Identify [C] and write the balanced reaction for the conversion of [B] to [C].

Seen in: Board 2025 · Sample 2023, 2024

55. Write the chemical test to distinguish between each of the following pairs of compounds: (i) Ethanol and propan-1-ol (ii) Phenol and benzoic acid

Seen in: Board 2024, 2025 · Sample 2025

56. Passage on alcohols and phenols (boiling point data: Propan-1-ol 370K, Butan-1-ol 391K, Butan-2-ol 371K, 2-methyl-propan-2-ol 356K). The boiling point of 2-methyl-propan-2-ol is much lower than that of butan-1-ol, although both have the same molecular formula. Give a reason.

Seen in: Sample 2024, 2027

57. Fill in the blank: The product formed when sodium phenoxide is treated with CO_2 at 400 K, under 4-7 atm pressure and then acidified with dilute HCl is _____. The reaction is known as _____ reaction.

Seen in: Sample 2024, 2027

58. Fill in the blank: A mixture of anhydrous ZnCl_2 and conc. HCl is called _____ reagent which shows maximum reactivity with _____ alcohol.

Seen in: Board 2026 · Sample 2024

59. OR An organic compound [A] having molecular formula $\text{C}_{10}\text{H}_{10}\text{O}$ forms a compound [B] with molecular formula $\text{C}_{10}\text{H}_8\text{O}$ on oxidation. Compound [B] gives a positive iodoform test. The reaction of compound [B] with CH_3MgBr followed by hydrolysis gives compound [C] with molecular formula $\text{C}_{10}\text{H}_{12}\text{O}$. Identify the compounds [A], [B] and [C]. Write the reaction for the conversion of compound [A] to compound [B].

Seen in: Board 2023, 2024

60. Write chemical equations to illustrate the following name reactions: (i) Finkelstein reaction (ii) Williamson's synthesis (iii) Reimer-Tiemann reaction

Seen in: Board 2025 · Sample 2023

61. Fill in the blank: The dehydration of ethyl alcohol with conc. H_2SO_4 at 140 degC mainly yields _____ while at 170 degC the main product formed is _____.

Seen in: Board 2024 · Sample 2023

Aldehydes, Ketones and Carboxylic Acids

62. Fill in the blank: Formaldehyde reacts with conc. alkali to give sodium formate and _____ due to the absence of alpha-hydrogen atom. The reaction is known as _____ reaction.

Seen in: Board 2024 · Sample 2025, 2026, 2027

63. Identify the compounds [A], [B], [C] and [D] in the following reaction: $\text{CH}_3\text{COOH} + \text{PCl}_5 \rightarrow [\text{A}]$
 $\xrightarrow{-\text{H}_2/\text{Pd}-\text{BaSO}_4, \text{boiling xylene}}$ [B] $\xrightarrow{-\text{K}_2\text{Cr}_2\text{O}_7+\text{H}_2\text{SO}_4/[\text{O}]}$ [C] $\xrightarrow{-\text{Ca}(\text{OH})_2, \text{heat}}$ [D]

Seen in: Board 2023, 2025 · Sample 2024, 2025

64. What happens when carbonyl compound is treated with zinc amalgam and concentrated hydrochloric acid? Give chemical equation and write the name of the reaction.

Seen in: Board 2023 · Sample 2025, 2026

65. An organic compound [A] ($C_{2Cl3O2H}$) is obtained when compound [B] reacts with red phosphorous and Cl_2 . [B] can be obtained on reaction of methyl magnesium bromide with carbon dioxide followed by acid hydrolysis. Upon partial reduction, [B] forms [C] (C_{2H4O}) which gives yellow precipitate of iodoform on heating with iodine and sodium hydroxide. [C] also reacts with dilute NaOH to form [D]. (a) Identify [A], [B], [C] and [D]. (b) Write the reaction for formation of [A] from [B]. What is the reaction called? (c) Write the chemical test to distinguish between [C] and acetone. (d) Which will be more acidic, [A] or [B]? Why?

Seen in: Sample 2023, 2027

66. An organic compound with molecular formula C_{3H6O} does not give silver mirror test with Tollen's reagent but gives an oxime with hydroxylamine. The compound is: (a) CH_3CH_2CHO (b) CH_3COCH_3 (c) $CH_2=CH-CH_2OH$ (d) $CH_2=CH-O-CH_3$

Seen in: Board 2024 · Sample 2026

67. Write chemical tests to distinguish between the following pairs of compounds: (a) Acetaldehyde and acetone (b) Acetic acid and benzaldehyde

Seen in: Board 2026 · Sample 2023

Organic Compounds containing Nitrogen

68. OR An organic compound [A] with molecular formula C_{3H7NO} forms compound [B] on heating with Br_2 and KOH. Compound [B] on heating with $CHCl_3$ and alcoholic KOH produces a pungent smelling compound [C]. Compound [B] on reacting with $C_6H_5SO_2Cl$ forms compound [D] which is soluble in alkali. Write the structures of compounds [A], [B], [C] and [D].

Seen in: Board 2023, 2025, 2026 · Sample 2023, 2026, 2027

69. Which of the following reactions will NOT give primary amine? (a) $C_{2H_5NC} \xrightarrow{LiAlH_4}$ (b) $C_{2H_5CN} \xrightarrow{LiAlH_4}$ (c) $C_{2H_5CONH_2} \xrightarrow{Br_2/KOH}$ (d) $CH_3CONH_2 \xrightarrow{Br_2/KOH}$

Seen in: Sample 2023, 2025, 2027

70. Write the chemical equations for the following conversions: (i) Nitrobenzene to benzene (ii) Aniline to bromobenzene (iii) Methyl cyanide to ethylamine

Seen in: Sample 2023, 2025, 2027

71. Write chemical reactions for the following named organic reactions: (i) Diazotisation reaction (ii) Sandmeyer's reaction

Seen in: Board 2026 · Sample 2023, 2026

72. Illustrate the following reactions with an example in each case: (a) Coupling reaction (b) Balz-Schiemann reaction

Seen in: Sample 2026, 2027

- 73.** Assertion: Aniline is soluble in HCl while it is only slightly soluble in water. Reason: Aniline cannot make hydrogen bonds with water but gets protonated easily by acids. (a) Both true, R correct explanation (b) Both true, R not correct explanation (c) A true, R false (d) A false, R true

Seen in: Board 2023 · Sample 2023, 2024

- 74.** The correct order of the increasing basic nature of Ammonia, Methylamine and Aniline is: (a) Methylamine < Aniline < Ammonia (b) Aniline < Methylamine < Ammonia (c) Ammonia < Aniline < Methylamine (d) Aniline < Ammonia < Methylamine

Seen in: Sample 2024, 2025

- 75.** OR How will the following be converted? (Give chemical equation) (a) Ethyl bromide to ethyl isocyanide. (b) Aniline to benzene diazonium chloride. (c) Benzene diazonium chloride to phenol.

Seen in: Board 2023 · Sample 2023

- 76.** Which one of the following can produce the foul smelling compound methyl isocyanide in presence of alcoholic KOH? (a) Chloroform and aniline (b) Chloroform and methanol (c) Chloroform and dimethyl amine (d) Chloroform and methyl amine

Seen in: Board 2023, 2025

Biomolecules

- 77.** (i) Identify the non-reducing sugar which on hydrolysis gives two reducing monosaccharides. (ii) Which structure of protein is normally unaffected during denaturation of protein? (iii) Name the vitamins whose deficiency cause the following diseases: (a) Rickets (b) Night blindness

Seen in: Board 2023, 2024, 2025 · Sample 2023, 2024, 2026, 2027

- 78.** (i) Give one example each of fibrous protein and globular protein. (ii) The structures of glycine and alanine are given. Draw the peptide linkage between these two amino acids. (iii) Justify that glucose is an aldose form of sugar, with the help of a chemical reaction.

Seen in: Board 2026 · Sample 2025