CBSE Class 12 Chemistry 2026 - Set 56/7/3 - Compartment

Question Paper

Conducted by the Central Board of Secondary Education (CBSE)

Time Allowed: 3 Hours **Maximum Marks: 70**

General Instructions

(i) This question paper contains 33 questions. All questions are compulsory.

(ii) This question paper is divided into five sections – Section A, B, C, D and E.

(iii) Section A – questions number 1 to 16 are multiple choice type questions. Each question carries 1 mark.

(iv) Section B – questions number 17 to 21 are very short answer type questions. Each question carries 2 marks.

(v) Section C – questions number 22 to 28 are short answer type questions. Each question carries 3 marks.

(vi) Section D – questions number 29 and 30 are case-based questions. Each question carries 4 marks.

(vii) Section E – questions number 31 to 33 are long answer type questions. Each question carries 5 marks.

(viii) There is no overall choice given in the question paper. However, an internal choice has been provided in few questions in all the sections except Section A.

(ix) Kindly note that there is a separate question paper for Visually Impaired candidates.

(x) Use of calculator is not allowed.

Section A

1. Match Column I with Column II and choose the correct option:

Column I	Column II
a. Osmotic pressure	i. $\Delta T_f = K_f m$
b. Elevation of boiling point	ii. $\pi = CRT$
c. Depression of freezing point	iii. $(P^\circ_1\text{-}P_1)/P^\circ_1 = W_2M_1/M_2W_1$
d. Relative lowering of vapour pressure	iv. $\Delta T_b = K_b m$

(A) a-i, b-ii, c-iii, d-iv (B) a-ii, b-i, c-iii, d-iv
(C) a-iv, b-iii, c-ii, d-i (D) a-ii, b-iv, c-i, d-iii

2. Functional groups present in amino acids are:

(A) $-NH_2$ and -OH (B) -OH and -COOH
(C) -COOH and $-NH_2$ (D) $-NH_2$ and $-SO_3H$

3. The correct order of reactivity of alcohols with Lucas reagent is:

(A) $3^\circ > 1^\circ > 2^\circ$ (B) $2^\circ > 1^\circ > 3^\circ$
(C) $1^\circ > 2^\circ > 3^\circ$ (D) $3^\circ > 2^\circ > 1^\circ$

4. According to Alfred Werner, the secondary valence(s) of the central metal atom/ion in a complex:

Identify the **incorrect** statement from the above given statements.

(A) are non-ionisable (B) are ionisable
(C) are satisfied by neutral molecules or negative ions (D) is equal to the coordination number and is normally fixed for a metal

5. Which of the following statements is true about a galvanic cell consisting of Cu and H_2 electrodes?

[Given: $E^\circ_{Cu^{2+}/Cu} = +0.34$ V, $E^\circ_{H^+/H_2,\,Pt} = +0.00$ V]

(A) Oxidation occurs at copper electrode (B) Reduction occurs at H_2 electrode
(C) H_2 is cathode and Cu is anode (D) H_2 is anode and Cu is cathode

6. The relationship between $E^\circ_{(cell)}$ and Δ_rG° is:

(A) $\Delta_rG^\circ = E^\circ_{(cell)}$ (B) $\Delta_rG^\circ = nF\,E^\circ_{(cell)}$
(C) $\Delta_rG^\circ = nE^\circ_{cell}$ (D) $\Delta_rG^\circ = -nF\,E^\circ_{(cell)}$

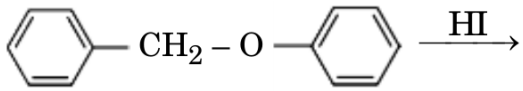
7. A galvanic cell functions like an electrolytic cell when:

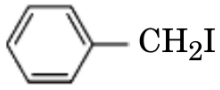
(A) $E_{cell} = E_{ext}$ (B) $E_{cell} > E_{ext}$
(C) $E_{ext} > E_{cell}$ (D) $E_{cell} = 0$

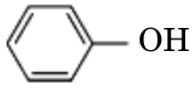
8. Phenol, on heating with conc. HNO_3, gives:

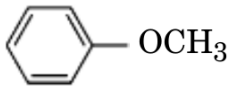
(A) o-Nitrophenol (B) p-Nitrophenol
(C) Picric acid (D) Sodium phenoxide

9. The products of the following reaction are:



(i) 

(ii) 

(iii) 

(A) (i) and (ii) (B) (i) and (iii)
(C) (ii) and (iii) (D) (i), (ii) and (iii)

10. The quantity of electricity in Faraday, required to reduce 1 mol of $Cr_2O_7^{2-}$ to Cr^{3+} is:

(A) 4F
(B) 3F
(C) 6F
(D) 5F

11. Which of the following elements exhibits maximum number of oxidation states?

(A) Scandium
(B) Zinc
(C) Manganese
(D) Cobalt

12. Which of the following reactions is used for the preparation of Aniline?

(A) Reaction of ethanolic NH_3 with C_6H_5Cl
(B) Reaction of Nitrobenzene with Hydrogen gas in presence of finely divided Nickel
(C) Reaction of Benzamide with $LiAlH_4$
(D) Reaction of Benzonitrile with $LiAlH_4$

13. **Assertion (A):** Out of $[Co(en)_3]^{3+}$ and $[Co(CN)_6]^{3-}$, coordination compound $[Co(en)_3]^{3+}$ is a more stable complex.

Reason (R): Ethane-1,2-diamine is a chelating ligand.

(A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).
(B) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A).
(C) Assertion (A) is true, but Reason (R) is false.
(D) Assertion (A) is false, but Reason (R) is true.

14. **Assertion (A):** Phosphorus halides are preferred over thionyl chloride for the preparation of alkyl halides from alcohols.

Reason (R): Reaction of alcohols with thionyl chloride forms pure alkyl halides.

(A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).
(B) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A).
(C) Assertion (A) is true, but Reason (R) is false.
(D) Assertion (A) is false, but Reason (R) is true.

15. **Assertion (A):** Aromatic carboxylic acids do not undergo Friedel-Crafts reaction.

Reason (R): Carboxyl group is deactivating and the catalyst aluminium chloride gets bonded to carboxyl group.

(A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).
(B) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A).
(C) Assertion (A) is true, but Reason (R) is false.
(D) Assertion (A) is false, but Reason (R) is true.

16. **Assertion (A):** The volume of an ideal solution is equal to the sum of the volumes of the two components, i.e., $\Delta_{mix}V = 0$.

Reason (R): The intermolecular forces of attraction between the solute-solvent molecules are weaker than those between the solute-solute and solvent-solvent molecules.

(A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).
(B) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A).
(C) Assertion (A) is true, but Reason (R) is false.
(D) Assertion (A) is false, but Reason (R) is true.

Section B

17(a). (i) Why do Zr and Hf exhibit similar properties?

(ii) 'E° for Mn^{3+}/Mn^{2+} couple is more positive than that for Fe^{3+}/Fe^{2+}.' Justify the statement.

[Atomic number: Mn = 25, Fe = 26]

OR

17(b). (i) Which element in 3d series of transition elements does not exhibit variable oxidation states? Give reason.

(ii) Explain why Cu^{+} is colourless in aqueous solution, whereas Cu^{2+} is coloured.

18. A reaction A → B follows second order kinetics. How will the rate of reaction be affected if the concentration of (i) A is increased by three times, and (ii) A is reduced to half?

19. Write the reactions taking place at anode and cathode in a lead storage battery, when it is in use.

20. 10 g of a non-volatile solute is dissolved in 200 g of water to make a solution. It has a vapour pressure of 31.84 mm Hg at 308 K.

Calculate the molar mass of the solute.

[Given: Vapour pressure of pure water at 308 K = 32 mm Hg]

21. Draw the structures of major monohalo products in each of the following:

(a) Cyclohexene + Br_2 $\xrightarrow{Heat}$

(b) 2-(Hydroxymethyl)phenol + $SOCl_2$ $\longrightarrow$

Section C

22(a). (i) Give a chemical test to distinguish between Propanal and Propanone.

(ii) Which of the given acids is stronger and why?

CF_3COOH or CH_3COOH

(iii) Complete the given reaction sequence:

$CH_3CH_2CH_2COOC_2H_5 \xrightarrow{NaOH} A + C_2H_5OH \xrightarrow{H_3O^+} B$

OR

22(b). An organic compound with the molecular formula $C_9H_{10}O$ forms 2,4-DNP derivative, reduces Tollens' reagent and undergoes Cannizzaro reaction. On vigorous Oxidation, it gives phthalic acid. Identify the compound. Write the reaction of this compound with Tollens' reagent and Cannizzaro reaction.

23. (a) Arrange the following compounds in the decreasing order of their acidic strength: Phenol, 4-Nitrophenol, 2,4,6-Trinitrophenol

(b) Why are alcohols more soluble in water than hydrocarbons of comparable molecular masses?

(c) Name the reagent used in the oxidation of a primary unsaturated alcohol to an aldehyde.

24. 2 g of Na_2SO_4 is dissolved in 50 g of water to form a solution. Calculate the freezing point of this solution, assuming Na_2SO_4 undergoes complete dissociation.

[Given: Molar mass of Na_2SO_4 = 142 g mol^{-1}, K_f for water = 1.86 K kg mol^{-1}]

25. (a) Write two structural differences between DNA and RNA.

(b) Which component of starch is a branched chain polymer of α-D-(+) glucose? Write its one characteristic feature.

(c) Which types of bonds hold the polypeptide chains in fibrous proteins?

26. (a) Why are haloarenes less reactive towards nucleophilic substitution reactions than haloalkanes? Give two reasons.

(b) Explain the Finkelstein reaction.

27. Conductivity of 2.5×10^{-4} M methanoic acid solution is 5.25×10^{-5} S cm^{-1}.

(a) Calculate its molar conductivity.

(b) Calculate its degree of dissociation.

[Given: $\lambda^\circ_{(H^+)}$ = 349.5 S cm^2 mol^{-1} and $\lambda^\circ_{(HCOO^-)}$ = 50.5 S cm^2 mol^{-1}]

28. (a) Define 'Denatured Protein' with an example.

(b) What happens when glucose reacts with HCN? Write the reaction involved.

(c) Name the disease caused by the deficiency of Vitamin C.

Section D

29(a). **Case Study:** Organic compounds containing carbonyl group as the functional group are aldehydes, ketones and carboxylic acids. The carbon-oxygen double bond is polarised due to higher electronegativity of oxygen as compared to carbon. Aldehydes are generally more reactive than ketones in nucleophilic addition reactions due to steric and electronic reasons. They react with HCN, Sodium bisulphite, Grignard reagent and a number of ammonia derivatives like Hydroxylamine, Hydrazine, Semicarbazide, etc. Aldehydes and ketones undergo various reactions due to the acidic nature of α-hydrogen. Aldehydes and ketones having at least one α-hydrogen atom undergo a reaction in the presence of dilute alkali as a catalyst to form β-hydroxy aldehydes or β-hydroxy ketones. On the other hand, aldehydes which do not possess an α-hydrogen undergo self-oxidation and reduction in the presence of concentrated alkali.

(a) From the compounds given below, identify which would undergo aldol condensation and which would undergo Cannizzaro reaction?

Cyclohexanone, Benzaldehyde, Methanal, 2-Methylpentanal

29(b). Arrange the following compounds in increasing order of reactivity towards nucleophilic addition reactions: Butanone, Propanone, Propanal, Ethanal

OR

29(b). Draw the structure of the semicarbazone of cyclohexanone.

29(c). Why is α-hydrogen of carbonyl group acidic in nature?

30(a). **Case Study:** Atomic radii is a useful property for determining many aspects of chemistry of elements such as physical and chemical properties. The periodic table greatly assists in finding a number of trends. The transition metals belong to group 3-12 and are generally characterised by partially filled d-orbitals in the free elements or their cations. The atomic radii of transition metals show a small decrease from left to right across a period, then remain nearly constant, and finally, slight increase towards the end of the series. The trend is a result of interplay between the increasing nuclear charge and the increasing shielding effect from the filling of d-orbitals. Initially the nuclear charge dominates, leading to decrease in size, but as more d-electrons are added, their shielding becomes more effective, balancing the increased nuclear charge and causing the radii to become constant. The increase in size between 3d and 4d metals is much greater than between the 4d and 5d metals. The atomic radii of 2nd and 3rd series are almost the same due to lanthanoid contraction. Increase in density is also observed on moving from left to right in a period.

(a) Give reasons for the following:

(i) The second and third series of transition metals resemble each other much more than they resemble the first series (3d).

(ii) Transition metals show variable oxidation states.

30(b). Why is Zn a non-transition element?

OR

30(b). Why do transition metals have high $\Delta_a H°$?

30(c). Why is there not much change in the atomic radius of the transition metals with the increase in atomic number?

Section E

31(a). (i) (I) The pK_b value of aniline is higher than that of methylamine. Explain why.

(II) Arrange the following compounds in decreasing order of their basic strength in the gaseous phase: NH_3, $(C_2H_5)_2NH$, $(C_2H_5)_3N$, $C_2H_5NH_2$

(III) What is Hinsberg's reagent? Mention its one use.

(ii) How will you convert the following:

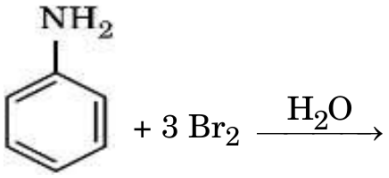
(I) Nitrobenzene to Benzenediazonium chloride?

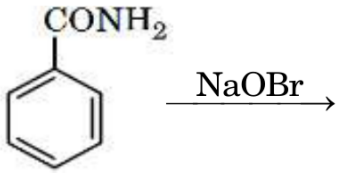
(II) Iodomethane to Ethanamine?

OR

31(b). (i) Complete the following equations:

(I) $CH_3NH_2 + C_6H_5COCl \rightarrow$

(II) 

(III) 

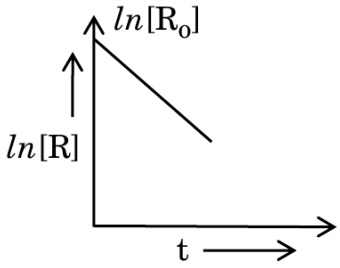
(ii) (I) Explain the carbylamine reaction.

(II) Why can aromatic primary amines not be prepared by the Gabriel phthalimide synthesis?

32(a). (i) A first order reaction is 20% complete in 10 minutes. Calculate the time taken when 80% of the reaction will be completed.

[Given: log 5 = 0.7, log 4 = 0.6]

(ii) For a chemical reaction R → P, variation in ln[R] vs. time (t) graph is given below:



(I) Predict the order of the reaction.

(II) Write the slope of the curve.

OR

32(b). (i) For first order reaction, calculate the ratio between the time taken to complete 3/4th of the reaction and the time taken to complete half of the reaction.

(ii) (I) What is meant by a complex reaction?

(II) Give an example of a pseudo first order reaction.

33(a). (i) (I) Explain why $[Fe(CN)_6]^{3-}$ is an inner orbital complex, whereas $[FeF_6]^{3-}$ is an outer orbital complex. [Atomic number: Fe = 26]

(II) Write the formula of the given complex: Hexaamminenickel(II) chloride

(ii) $[Ni(H_2O)_6]^{2+}$ is green in colour, whereas $[Ni(CN)_4]^{2-}$ is colourless. Explain. [Atomic number: Ni = 28]

OR

33(b). (i) (I) Write IUPAC name of the given complexes: $[Ag(CN)_2][Ag(NH_3)_2]$

(II) What is the coordination number of the central metal ion in the following complexes? $[Fe(C_2O_4)_3]^{3-}$ and $[Cr(NH_3)_3Cl_3]$

(III) Draw a geometrical isomer of the complex $[CoCl_2(en)_2]^{+}$, which is optically active.

(ii) Using valence bond theory, explain the hybridization of $[Ni(CO)_4]$ and its magnetic behaviour. [Atomic number: Ni = 28]

- End of Question Paper -