CHEMISTRY
SAMPLE QUESTION PAPER

CBSE 2025-26

General Instructions :

Read the following instructions carefully.

1. *There are 33 questions in this question paper with internal choice.*
2. *SECTION A consists of 16 multiple-choice questions carrying 1 mark each.*
3. *SECTION B consists of 5 short answer questions carrying 2 marks each.*
4. *SECTION C consists of 7 short answer questions carrying 3 marks each.*
5. *SECTION D consists of 2 case-based questions carrying 4 marks each.*
6. *SECTION E consists of 3 long answer questions carrying 5 marks each.*
7. *All questions are compulsory.*
8. *Use of log tables and calculators is not allowed.*

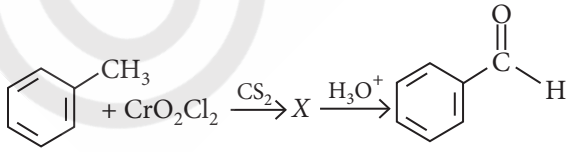
Time Allowed : *3 hours* ***Maximum Marks :*** *70*

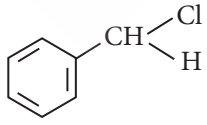
SECTION A

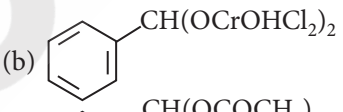
Question 1 to 16 are multiple choice questions. Only one of the choices is correct. Select and write the correct choice as well as the answer to these questions.

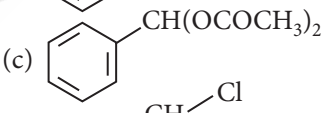
1. Oxidation of aniline with conc. sulphuric acid followed by heating produces
(a) phenylhydroxylamine
(b) nitrobenzene
(c) sulphanilic acid
(d) phenol.

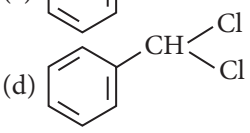
2. The intermediate compound *X* in the following chemical reaction is



(a) 

(b) 

(c) 

(d) 

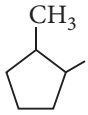
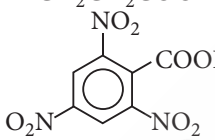
3. Match the column I with column II and mark the appropriate choice.

Column I		Column II	
(A)	An element which can show +8 oxidation state	(i)	Ce
(B)	An element with +7 as the most stable oxidation state in its oxides	(ii)	Pm
(C)	Radioactive lanthanoid	(iii)	Os
(D)	Lanthanoid which shows +4 oxidation state	(iv)	Mn

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

4. Arrange the following compounds in order of increasing dipole moment.
(I) Toluene
(II) *m*-Dichlorobenzene
(III) *o*-Dichlorobenzene
(IV) *p*-Dichlorobenzene
(a) I < IV < II < III (b) IV < I < II < III
(c) IV < I < III < II (d) IV < II < I < III

5. Consider the reaction, $2N_2O_5 \longrightarrow 4NO_2 + O_2$
In the reaction, NO_2 is being formed at the rate of 0.0125 mol L^{-1} s^{-1}. What is the rate of reaction at this time?
(a) 0.0018 mol L^{-1} s^{-1} (b) 0.0031 mol L^{-1} s^{-1}
(c) 0.0041 mol L^{-1} s^{-1} (d) 0.050 mol L^{-1} s^{-1}

6. Which of the following IUPAC names is not correctly matched?
(a)  COOH : 3-Cyclopentylpropanoic acid
(b) $(CH_3)_2C{=}CHCOOH$: 3-Methylbut-2-enoic acid
(c) $PhCH_2CH_2COOH$: 3-Phenylpropanoic acid
(d)  : 2, 4, 6-Trinitrobenzoic acid

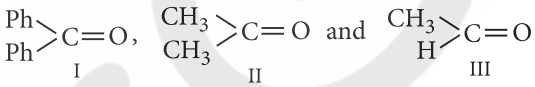
7. Which of the following statements is correct?
(a) In $K_3[Fe(CN)_6]$, the ligand has satisfied only the secondary valency of ferric ion.
(b) In $K_3[Fe(CN)_6]$, the ligand has satisfied both primary and secondary valencies of ferric ion.
(c) In $K_4[Fe(CN)_6]$, the ligand has satisfied both primary and secondary valencies of ferrous ion.
(d) In $Cu(NH_3)_4SO_4$, the ligand ammonia has satisfied primary valency only.

8. The term anomers of glucose refers to
(a) isomers of glucose that differ in configurations at carbons one and four (C-1 and C-4)
(b) a mixture of (*D*)-glucose and (*L*)-glucose
(c) enantiomers of glucose
(d) isomers of glucose that differ in configuration at carbon one (C-1).

9. Which of the following order of magnetic moment of ions is correct?
(a) $Mn^{2+} > Cu^{2+}$ (b) $Fe^{2+} < V^{2+}$
(c) $Ti^{2+} < Ti^{3+}$ (d) $Cr^{2+} < Co^{2+}$

10. Half-life period of a first order reaction is 1386 seconds. The specific rate constant is
(a) 0.5×10^{-2} s^{-1} (b) 0.5×10^{-4} s^{-1}
(c) 5.0×10^{-2} s^{-1} (d) 0.5×10^{-3} s^{-1}

11. Dye test can be used to distinguish between
(a) ethylamine and acetamide
(b) ethylamine and aniline
(c) urea and acetamide
(d) methylamine and ethylamine.

12. The order of reactivity of phenyl magnesium bromide (PhMgBr) with the following compounds:

(a) III > II > I (b) II > I > III
(c) I > III > II (d) I > II > III

13. **Assertion (A) :** $[Fe(CN)_6]^{3-}$ is weakly paramagnetic while $[Fe(CN)_6]^{4-}$ is diamagnetic.
Reason (R) : $[Fe(CN)_6]^{3-}$ has +3 oxidation state while $[Fe(CN)_6]^{4-}$ has +2 oxidation state.
Select the most appropriate answer from the options given below :
(a) Both A and R are true and R is the correct explanation of A.
(b) Both A and R are true but R is not the correct explanation of A.
(c) A is true but R is false.
(d) A is false but R is true.

14. **Assertion (A) :** Kohlrausch's law helps to find the molar conductivity of weak electrolyte at infinite dilution.
Reason (R) : Molar conductivity of a weak electrolyte at infinite dilution cannot be determined experimentally.
Select the most appropriate answer from the options given below :
(a) Both A and R are true and R is the correct explanation of A.
(b) Both A and R are true but R is not the correct explanation of A.
(c) A is true but R is false.
(d) A is false but R is true.

15. Assertion (A) : Fructose is a reducing sugar.
Reason (R) : Fehling's solution on treatment with fructose gives brick red ppt.
Select the most appropriate answer from the options given below :
(a) Both A and R are true and R is the correct explanation of A.
(b) Both A and R are true but R is not the correct explanation of A.
(c) A is true but R is false.
(d) A is false but R is true.

16. Assertion (A) : Half-life of a reaction following first order kinetics is independent of concentration.
Reason (R) : The time required to complete any definite fraction of the first order reaction is independent of the initial concentration.
Select the most appropriate answer from the options given below :
(a) Both A and R are true and R is the correct explanation of A.
(b) Both A and R are true but R is not the correct explanation of A.
(c) A is true but R is false.
(d) A is false but R is true.

SECTION B

Question No. 17 to 21 are very short answer questions carrying 2 marks each.

17. Give reasons :
(a) 0.1 M KCl has higher boiling point than 0.1 M glucose.
(b) Meat is preserved for a longer time by salting.

18. Give reason and select one atom/ion which will exhibit asked property :
(a) Sc^{3+} or Cr^{3+} (exhibit diamagnetic behaviour)
(b) Cr or Cu (high melting and boiling point)

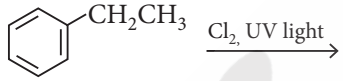
19. Calculate the emf of the following cell at 25°C :
$Al_{(s)} |Al^{3+}$ (0·001 M) || Ni^{2+} (0.1 M) $|Ni_{(s)}$
Given : $E^{\circ}_{(Ni^{2+}/Ni)} = -0{\cdot}25$ V
$E^{\circ}_{(Al^{3+}/Al)} = -1{\cdot}66$ V
[log 2 = 0·3010, log 3 = 0·4771]

20. In which of the two compounds $CH_3CH_2CH_2Cl$ or C_6H_5Cl will the C—Cl bond be longer? Why?

OR

(a) In the following pair of compounds, which compound undergoes S_N2 reaction faster and why?

(b) Write the major product in the following :



21. Glucose does not give a positive result with the Schiff's reagent in the Schiff's test. Based on the above information
(a) Give a reason for the observation.
(b) What type of carbonyl group is present in a glucose molecule?

SECTION C

Question No. 22 to 28 are short answer questions, carrying 3 marks each.

22. When a steady current of 2A was passed through two electrolytic cells *A* and *B* containing electrolytes $ZnSO_4$ and $CuSO_4$ connected in series, 2 g of Cu were deposited at the cathode of cell *B*. How long did the current flow? What mass of Zn was deposited at cathode of cell *A*?
[Atomic mass : Cu = 63.5 g mol^{-1}, Zn = 65 g mol^{-1}; 1F = 96500 C mol^{-1}]

23. Answer the following : **(Attempt any 3)**
(a) Why is first ionisation enthalpy of chromium lower than that of Zn?
(b) Out of $KMnO_4$ and K_2MnO_4, which one is paramagnetic and why?
(c) Complete the following ionic equation :
$Cr_2O_7^{2-} + 14H^+ + 6e^- \longrightarrow$
(d) Write the formula of an oxoanion of manganese (Mn) in which it shows the oxidation state equal to its group number.

24. An aromatic compound *A* on treatment with $CHCl_3$ and KOH gives *B* & *C*, both of which, in turn give the same compound *D* when distilled with Zn dust. Oxidation of *D* yields *E* of formula $C_7H_6O_2$. The sodium salt of *E* on heating with soda lime gives *F* which can also be obtained by distilling *A* with Zn dust. Identify *A*, *B*, *C*, *D*, *E* and *F*.

25. **(a)** Amino acids show amphoteric behaviour. Why?

(b) Write one difference between α-helix and β-pleated structure of protein.

(c) What is the difference between acidic amino acids and basic amino acids?

26. **(a)** Give a chemical test to distinguish between 2-pentanol and 3-pentanol.

(b) How are the following conversions carried out?

(i) Benzyl chloride to benzyl alcohol

(ii) Cumene to phenol.

27. Following compounds are given to you :

2-Bromopentane,2-Bromo-2-methylbutane,

1-Bromopentane

(a) Write the compound which is most reactive towards S_N2 reaction.

(b) Write the compound which is optically active.

(c) Write the compound which is most reactive towards β-elimination reaction.

28. **(a)** The standard Gibbs energy ($\Delta_r G°$) for the following cell reaction is -300 kJ mol^{-1} :

$Zn_{(s)} + 2Ag^{+}_{(aq)} \rightarrow Zn^{2+}_{(aq)} + 2Ag_{(s)}$

Calculate E°_{cell} for the reaction.

(Given: 1F = 96500 C mol^{-1})

(b) Calculate λ°_m for $MgCl_2$ if λ° values for Mg^{2+} ion and Cl^- ion are 106 S cm^2 mol^{-1} and 76.3 S cm^2 mol^{-1} respectively.

SECTION D

Question No. 29 & 30 are case-based/data -based questions carrying 4 marks each.

29. The rate law for a chemical reaction relates the reaction rate with the concentrations or partial pressures of the reactants. For a general reaction, $aA + bB \rightarrow C$, with no intermediate steps in its reaction mechanism, meaning that it is an elementary reaction, the rate law is given by $r = k[A]^x[B]^y$, where $[A]$ and $[B]$ express the concentrations of A and B in moles per litre. Exponents x and y vary for each reaction and are determined experimentally. The value of k varies with conditions that affect reaction rate, such as temperature, pressure, surface area, etc. The sum of these exponents is known as overall reaction order. A zero order reactions has constant rate that is independent of the concentration of the reactions. A first order reaction depends on the concentration of only one reactant. A reaction is said to be second order when the overall order is two.

(a) A first order reaction takes 77.78 minutes for 50% completion. Calculate the time required for 30% completion of this reaction.
(log 10 = 1, log 7 = 0.8450)

(b) The overall order of a reaction which has the following rate expression :
Rate = $k\,[A]^{1/2}\,[B]^{3/2}$ is
(i) 3 (ii) 2 (iii) 4 (iv) 1.

OR

What is the effect of temperature on rate of reaction?
(i) Decreases with increase in temperature.
(ii) Remains unaltered.
(iii) Increases with increase in temperature.
(iv) None of the above.

(c) The order of reaction, which do not dependent on concentration is
(i) 2 (ii) 1 (iii) 0 (iv) 3

30. Amines are alkyl or aryl derivatives of ammonia formed by replacement of one or more hydrogen atoms. Alkyl derivatives are called aliphatic amines and aryl derivatives are known as aromatic amines. The presence of aromatic amines can be identified by performing dye test. Aniline is the simplest example of aromatic amine. It undergoes electrophilic substitution reactions in which —NH_2 group strongly activates the aromatic ring through delocalisation of lone pair of electrons of N-atom. Aniline undergoes electrophilic substitution reactions. *Ortho* and *para* positions to the –NH_2 group become centres of high electrons density. Thus, –NH_2 group is *ortho* and *para*-directing and powerful activating group.

(a) How will you distinguish cyclohexylamine and aniline?

(b) What happens when aniline is treated with Br_2 in H_2O?

(c) What is the major product obtained by acetylation of aniline followed by nitration (conc.HNO_3 + conc.H_2SO_4) and then alkaline hydrolysis?

OR

What does aniline produce in carbylamine reaction? Write chemical equation of the reaction involved.

SECTION-E

Question No. 31 to 33 are long answer type questions carrying 5 marks each.

31. **(a)** On the basis of crystal field theory, write the electronic configuration for d^4 with a strong field ligand for which $\Delta_o > P$.

(b) Write IUPAC name of the complex $[Pt(en)_2Cl_2]$. Draw structures of geometrical isomers for this complex.

OR

(a) Indicate the types of isomerism exhibited by the following complexes :

(i) $[Co(NH_3)_5(NO_2)]^{2+}$

(ii) $[Co(en)_3]Cl_3$ (*en* = ethylene diamine)

(iii) $[Pt(NH_3)_2Cl_2]$

(b) Using IUPAC norms write the formulae for the following :

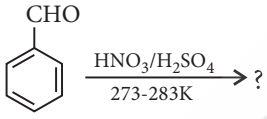
(i) Pentaamminenitrito–O–cobalt(III) chloride

(ii) Potassium tetracyanidonickelate(II)

32. Predict the products of the following reactions :

(a) $CH_3-\underset{\underset{CH_3}{|}}{C}=O \xrightarrow[\text{(ii) KOH/Glycol, } \Delta]{\text{(i) } H_2N-NH_2} ?$

(b) $C_6H_5-CO-CH_3 \xrightarrow{NaOH/I_2} ? + ?$

(c) 

OR

Explain the following reactions:

(a) Clemmensen reduction

(b) Cannizzaro reaction

33. **(a)** State Raoult's law for a solution containing volatile components. Name the solution which follows Raoult's law at all concentrations and temperatures.

(b) What role does the molecular interaction play in the solution of ethanol and acetone in term of ideal and non ideal?

OR

(a) Why is the value of van't Hoff factor for ethanoic acid in benzene close to 0.5?

(b) Determine the osmotic pressure of a solution prepared by dissolving 2.32×10^{-2} g of K_2SO_4 in 2 L of solution at 25°C, assuming that K_2SO_4 is completely dissociated.

(c) When 25.6 g of sulphur was dissolved in 1000 g of benzene, the freezing point lowered by 0.512 K. Calculate the formula of sulphur (S_x).
(K_f for benzene = 5.12 K kg mol^{-1}, Atomic mass of sulphur = 32 g mol^{-1})