

**CBSE Board**  
**Class XII Chemistry**  
**Sample Paper -15**

Time: 3 Hrs

Total Marks: 70

1. All questions are compulsory.
2. Question nos. **1 to 8** are very short answer questions and carry 1 mark each
3. Question nos. **9 to 18** are short answer questions and carry 2 marks each.  
Use of calculator is not permitted.
4. Question nos. **19 to 27** are also short answer questions and carry 3 marks each
5. Question nos. **28 to 30** are long answer questions and carry 5 marks each
6. Use log tables if necessary, use of calculators is not allowed.

**Q.1** The rate law for a reaction is:  $\text{Rate} = k [A] [B]^{3/2}$

Can the reaction be an elementary process? Explain.

**Q.2** Why is silica gel is used as a dehumidizer?

**Q.3** What is the shape of chlorate ion?

**Q.4** Name the type of isomerism exhibited by  $[\text{Cr}(\text{en})_3]^{3+}$ .

**Q.5** Which isomer viz., 1, 2- and 1, 4-dichlorobenzenes, has the larger value of dipole moment?

**Q.6** The boiling point of ethers are lower than the corresponding isomeric alcohols. Explain.

**Q.7** Suggest a suitable reagent to convert:  
 $(\text{CH}_3)_2\text{C}=\text{CH}-\text{CO}-\text{CH}_3$  to  $(\text{CH}_3)_2\text{C}=\text{CHCOOH}$ .

**Q.8** What are the components of a nucleoside?

**Q.9**

(a) Au having atomic radius 144 pm crystallises in a fcc structure. Find the edge length of the cell.

(b) Give the significance of a lattice point.

**Q.10** A compound is formed by two elements X and Y. Atoms of the element Y (as anions) make *ccp* and those of the element X (as cations) occupy all the octahedral voids. What is the formula of the compound?

**Q.11** Which of the following will have a greater conduction?

(a) 0.1 M acetic acid solution or 1 M acetic acid solution.

(b) 0.1 M NaCl solution at 25°C or 0.1 M NaCl solution at 50°C.

**Q.12** The reaction between  $H_2$  and  $O_2$  yielding  $H_2O$  is exothermic. Then why the reaction does not proceed under ordinary conditions?

**Q.13** The activation energy of a reaction is of 50 kJ/mol. If temperature increases from 300 to 310 K, what will be the change in reaction rate of the reaction?

**Q.14**

(a) Give the reason for bleaching action of chlorine molecule.

(b)  $PH_3$  has lower boiling point than  $NH_3$ . Why?

**Q.15**

(a) Why is the second ionisation constant of sulphuric acid in water much less than the first ionisation constant?

(b) Give the product in the following reactions:

(i)  $NH_4Cl(aq) + NaNO_2(aq) \rightarrow$ Product/s

(ii)

$Ba(N_3)_2 \xrightarrow{\text{thermal decomposition}} \text{Product/s}$

**Q.16**

(a) Specify the oxidation number of the metal in the following complex compounds:

(i)  $K_3[Fe(CN)_6]$

(ii)  $[Cr(NH_3)_3Cl_3]$

(iii)  $[Co(H_2O)(CN)(en)_2]^{2+}$

(iv)  $Ni(CO)_4$

(b) Write the formulas for the following coordination compounds:

(i) Potassium trioxalatoaluminate(III)

(ii) Dichloridobis (ethane-1,2-diamine)cobalt(III)

**Q.17** A mixture of two compounds, A and B, was dissolved in HCl and filtered off. The residue, on chemical analysis, was found to be a ketone, which on vigorous oxidation gave benzoic acid and butyric acid. The HCl-soluble portion, upon neutralisation with sodium carbonate, gave a nitrogen containing compound A. Diazotisation of compound A followed by heating with water gave alpha naphthol. Identify compounds A and B.

**OR**

What are lyophilic and lyophobic colloids? Which of these sols can be easily coagulated on the addition of small amounts of electrolytes?

**Q.18** Suggest one method each for the following conversions:

- (i) Nitrobenzene into aniline,
- (ii) Nitrobenzene into azobenzene,
- (iii) Nitrobenzene into phenylhydroxyl amine and
- (iv) Nitrobenzene into p-aminophenol.

**Q.19**

- (a) How long would it take to deposit 60.8 g of Ag from a solution of silver(I) nitrate by a current of 5.036 ampere?
- (b) Write the cathode and anode half-cell reactions for the following reaction:  

$$\text{Cu(s)} + 2\text{Ag}^+(\text{aq}) \rightarrow \text{Cu}^{2+}(\text{aq}) + 2\text{Ag(s)}$$

**Q.20**

- (a) What happens when a colloidal sol of  $\text{Fe(OH)}_3$  and  $\text{As}_2\text{O}_3$  are mixed?
- (b) Explain the Bredig's Arc method for the preparation of colloids. Give one example of a colloid which can be prepared by this method.

**Q.21**

- (a) How is nickel refined to get it in pure form?
- (b) Which method of refining is generally used when a metal of high degree of purity is needed?

**Q.22** Complete and balance the following reactions:

- (i)  $\text{PbO}_2 \xrightarrow{\text{Heat}}$
- (ii)  $\text{Li} + \text{N}_2 \xrightarrow{\text{Heat}}$
- (iii)  $\text{P}_4 + \text{NaOH} + \text{H}_2\text{O} \rightarrow$

**Q.23** Explain why in the presence of peroxide, hydrogen chloride and hydrogen iodide don't give anti-Markovnikov's addition to propene whereas hydrogen bromide does?

**Q.24**

- (i) Arrange the following in increasing order of basicity:  
 $\text{H}_2\text{O}$ ,  $\text{HO}^-$ ,  $\text{CH}_3\text{O}^-$ ,  $\text{CH}_3\text{OH}$
- (ii) Which of these is the strongest nucleophile? Give the weakest nucleophile among these?
- (iii) What is the name of reaction in which  $\text{CS}_2$  and  $\text{HgCl}_2$  are used?

**OR**

Gold crystallizes in face-centred cubic unit cell. Each side of this unit cell has a length of 407 pm. Calculate the radius of the gold atom. (Assume the atoms just touch each other on the diagonal across the face of the unit cell. That is each face atom is touching the four corner atoms.)

**Q.25**

- (a) Give two salient features of amino acids.
- (b) Give a succinct definition of carbohydrates and their classification, too.
- (c) Write the chemical formulas of sucrose and cellulose.

**Q.26**

- (a) What is nylon-6, 6? How is it prepared?
- (b) What are elastomers?

**Q.27** Give a brief account of medicinal products.

**Q.28**

- (a) What are ideal and non-ideal solutions?
- (b) Why do we get abnormal molar masses from colligative property measurements?
- (c) How can we come to know the cause of abnormal behaviour – association or dissociation of molecules?
- (d)  $200 \text{ cm}^3$  of an aqueous solution of a protein contains 1.26 g of the protein. The osmotic pressure of such a solution at 300 K is found to be  $2.57 \times 10^{-3}$  bar.  
 Calculate the molar mass of the protein.

**OR**

**Q.28**

- In what different ways the concentrations of solutions are expressed?
- Explain any one of them.
- Calculate molality of 2.5 g of ethanoic acid ( $\text{CH}_3\text{COOH}$ ) in 75 g of benzene.

**Q.29**

- Explain the magnetic behaviour of copper in +1 and +2 oxidation states.
- Which will have intense colour, a Cr(II) salt or a Mn(II) salt? Give reason?
- Explain why Mn and Cr show several oxidation states?

**OR**

**Q.29**

- Describe the magnetic behaviour of Eu(II) and Eu(III) salts.
- Why only transition elements form carbonyl compounds? Explain.
- Which 4f element has half-filled f-orbital in its +3 oxidation state?

**Q.30**

- Give three methods to convert methylbenzene into benzaldehyde.
- Write the product obtained when ethylbenzene is treated with hot alkaline potassium permanganate.
- Complete the following reactions:
  - Phthalic acid and thionyl chloride /heat;
  - 2,2,6-Trimethylcyclohexanone is treated with H-CN;
  - Nitrobenzene is heated with benzoyl chloride in the presence of  $\text{AlCl}_3$ .

**OR**

**Q.30** Write names and structures of the missing reactants (R, R', R'' etc.), reagents (r, r', r'' etc.), Products (P, P', X, Y) and reactions (N, N' etc.) in the following schemes:

- Ethanoic acid + r  $\rightarrow$  Ammonium ethanoate (=B);  
 $\text{B} + \text{heat} \rightarrow \text{P} + \text{water}$ ;  
 $\text{P} + \text{Br}_2/\text{NaOH}/\text{N} \rightarrow \text{CH}_6\text{N}$
- $\text{R}' + \text{NaOH}/\text{water}/\text{heat} \rightarrow$  amide of hexanoic acid
- $\text{R}''$  (an alkanone) + KOH +  $\text{I}_2 \rightarrow \text{P}'$  (a bright yellow solid) + butanoic acid (N')
- $\text{R}''' + \text{Mg}/\text{ether}/\text{heat} \rightarrow \text{X}$ ;  
 $\text{X} + \text{O}=\text{C}=\text{O} \rightarrow \text{Y}$ ;  
 $\text{Y} + \text{H}_2\text{O} \rightarrow \text{C}_6\text{H}_5\text{-COOH}$