



CHEMISTRY  
Class 12 - Chemistry

Time Allowed: 3 hours

Maximum Marks: 70

General Instructions:

The question paper is divided into **four sections**:

1. **Section A**

- Q. No. 1 contains **Ten multiple choice type** of questions carrying **One mark** each.
- Q. No. 2 contains **Eight very short answer type** of questions carrying **One mark** each.

2. **Section B**

- Q. No. 3 to Q. No. 14 contain **Twelve short answer type** of questions carrying **Two marks** each. (Attempt any Eight).

3. **Section C**

- Q. No. 15 to Q. No. 26 contain **Twelve short answer type** of questions carrying **Three marks** each. (Attempt any Eight).

4. **Section D**

- Q. No. 27 to Q. No. 31 contain **Five long answer type** of questions carrying **Four marks** each. (Attempt any Three).

5. Use of the log table is allowed. Use of calculator is not allowed.

6. Figures to the right indicate full marks.

7. For each MCQ, correct answer must be written along with its alphabet. e.g., (a).... / (b) ..... / (c)..... / (d)..... Only first attempt will be considered for evaluation.

8. Physical constants:- i) ----- ii) ----- iii) -----

**Section A**

1. **Select and write the correct answer:** [10]

(a) The relation between radius of sphere and edge length in body centered cubic lattice is given by formula: [1]

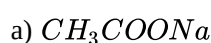
a)  $r = \frac{\sqrt{3}}{4} \times a$

b)  $r = \frac{\sqrt{3}}{4} a$

c)  $r = \frac{\sqrt{2}}{4} \times a$

d)  $\sqrt{3}r = 4a$

(b) An aqueous solution of which one of the following salts is basic? [1]



- c)  $CuSO_4$  d)  $KNO_3$
- (c) The kinetic order for the following reaction is \_\_\_\_\_. [1]  

$$2N_2O_{(g)} \xrightarrow{Pt} 2N_{2(g)} + O_{2(g)}$$
- a) second b) zero  
 c) first d) third
- (d) Which of the following element does NOT exhibit variable oxidation states? [1]  
 a) Manganese b) Iron  
 c) Copper d) Zinc
- (e) Identify complex ion in which effective atomic number of the central metal ion is 35. [1]  
 (Given At. Number of  $Co = 27, Fe = 26, Zn = 30$ )  
 a)  $[Co(NH_3)_6]^{3+}$  b)  $[Fe(CN)_6]^{3-}$   
 c)  $[Zn(NH_3)_4]^{2+}$  d)  $[Fe(CN)_6]^{4-}$
- (f)  $C_2H_5 - Br + NaI \xrightarrow{\text{dry acetone}} C_2H_5 - I + NaBr.$  [1]  
 The above reaction is \_\_\_\_\_.  
 a) Wurtz reaction b) Balz-Schiemann reaction  
 c) Finkelstein reaction d) Swarts reaction
- (g) The gas evolved, when ethyl alcohol reacts with sodium metal is: [1]  
 a)  $H_2$  b)  $N_2$   
 c)  $O_2$  d)  $Cl_2$
- (h) The numbers of primary and secondary hydroxyl groups in ribose are \_\_\_\_\_ respectively. [1]  
 a) 1, 3 b) 3, 2  
 c) 3, 1 d) 2, 3
- (i) ZWT in green chemistry stands for: [1]  
 a) zubl water technology b) zero waiting time  
 c) zhen wu tang d) zero waste technology
- (j) Which among the following reducing agents is NOT used to reduce acetaldehyde to ethyl alcohol? [1]  
 a)  $Zn - Hg$  and conc. HCl b)  $H_2$ -Raney Ni  
 c)  $\frac{LiAlH_4}{H^+}$  d)  $Na - Hg$  and water

2. Answer the following: [8]
- (a) Define nanoscience. [1]  
 (b) How is ethanamine prepared by using methyl cyanide? [1]  
 (c) Write structures of enantiomers of lactic acid. [1]  
 (d) Write the chemical composition of cryolite. [1]  
 (e) Write the formula for Pentaammine chlorocobalt(III) sulphate. [1]  
 (f) State Henry's law. How does solubility of a gas in water varies with the temperature? [1]  
 (g) Define the term **enthalpy**. [1]

(h) Write the unit of cell constant.

[1]

### Section B

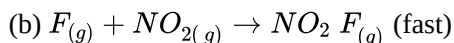
#### Attempt any 8 questions

3. Explain why,  ${}_{63}\text{Eu}$  and  ${}_{70}\text{Yb}$  show +2 oxidation state. [2]
4. i. What is osmotic pressure? [2]  
ii. How will you determine molar mass of solute from osmotic pressure?
5. Write two advantages of nanoparticles and nanotechnology. [2]
6. How is cumene converted into phenol? [2]
7. Write a note on Sandmeyer's reaction. [2]
8. Give the limitations of Arrhenius theory of acids and bases. [2]
9. Write acetylation reactions of: [2]  
i. Ethylamine  
ii. Diethylamine
10. For a certain reaction  $\Delta H^\circ$  is  $-224\text{kJ}$  and  $\Delta S^\circ$  is  $-153\text{J K}^{-1}$ . At what temperature the change over from spontaneous to nonspontaneous will occur? [2]
11. Classify the following carbohydrates [2]  
i. Cellulose  
ii. Maltose  
iii. Raffinose  
iv. Fructose
12. Define standard enthalpy of combustion. [2]
13. Write the structure of melamine. [2]
14. Write balanced chemical equation for the following: [2]  
Action of ozone on hydrogen peroxide.

### Section C

#### Attempt any 8 questions

15. Derive the relation between elevation of boiling point and molar mass of solute. [3]
16. Explain the following terms: [3]  
i. Substitutional impurity defect  
ii. Interstitial impurity defect
17. Write the cell representation and calculate equilibrium constant for the following redox reaction: [3]  
 $\text{Ni}_{(s)} + 2\text{Ag}^+_{(aq)}(1\text{M}) \rightarrow \text{Ni}^{2+}_{(aq)}(1\text{M}) + 2\text{Ag}_{(s)}$  at  $25^\circ\text{C}$   
 $E^\circ_{\text{Ni}} = -0.25\text{ V}$  and  $E^\circ_{\text{Ag}} = 0.799\text{ V}$
18. Explain dehydrohalogenation reaction of 2-chlorobutane. [3]
19. 2000 mmol of an ideal gas expanded isothermally and reversibly from 20 L to 30 L at 300 K, calculate the work done in the process ( $R = 8.314\text{ J K}^{-1}\text{ mol}^{-1}$ ). [3]
20. Explain the cause and effects of lanthanoid contraction. [3]
21. Solubility product of magnesium hydroxide is  $1.4 \times 10^{-11}$ . Calculate the solubility of magnesium hydroxide. [3]
22. Write four postulates of Werner's theory. [3]
23. A chemical reaction occurs in the following steps: [3]  
(a)  $\text{NO}_{2(g)} + \text{F}_{2(g)} \rightarrow \text{NO}_2\text{F}_{(g)} + \text{F}_{(g)}$  (slow)



- i. Write the equation of overall reaction.
  - ii. Write down rate law.
  - iii. Identify the reaction intermediate.
24. What is the action of the following on carboxylic acid: [3]
- i.  $SOCl_2$
  - ii.  $P_2O_5$ ?
25. What is the action of chlorine on the following: [3]
- i.  $NH_3$  (excess)
  - ii. phosphorus?
26. **Answer the following:** [3]
- (a) Write preparation of acetic acid from [2]
    - i. dry ice
    - ii. acetyl chloride
  - (b) What is the action of benzene diazonium chloride on ethanol? [1]

**Section D**

**Attempt any 3 questions**

27. **Answer the following:** [4]
- (a) Define: [2]
    - i. Average rate of reaction.
    - ii. Instantaneous rate of reaction.
  - (b) Write chemical composition of haematite. [1]
  - (c) Write the reaction involved in sol-gel process during hydrolysis. [1]
28. **Answer the following:** [4]
- (a) Define reversible process. [2]
  - (b) Define: Elastomer. [1]
  - (c) What are monosaccharides? [1]
29. **Answer the following:** [4]
- (a) Silver crystallizes in fcc structure. If edge length of unit cell is  $400 \text{ pm}$ , calculate density of silver (Atomic mass of  $Ag = 108$ ). [2]
  - (b) Identify A and B in the following reaction: [2]
$$CH_3 - Br + Mg \xrightarrow{\text{dry ether}} A + CO_2 \xrightarrow[\text{H}^+/\text{H}_2\text{O}]{\text{dry ether}} B + Mg(\text{Br})\text{OH}$$
30. **Answer the following:** [4]
- (a) What is effective atomic number (EAN)? [2]
  - (b) State Kohlrausch's law of independent migration of ions. [1]
  - (c) What happens when ethene reacts with iodine monochloride? [1]
31. **Answer the following:** [4]
- (a) Write a chemical equation for the action of neutral ferric chloride on phenol. [2]
  - (b) Draw structures of the following compounds: [2]
    - i. chloric acid
    - ii. peroxydisulphuric acid

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