

DELHI PUBLIC SCHOOL, BAHADURGARH

CLASS: XII Sample Paper

SUBJECT: CHEMISTRY (SET-1)

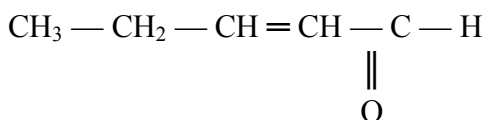
TIME: 3hours

M.MARKS: 70

GENERAL INSTRUCTIONS:

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

1. How may the conductivity of an intrinsic semiconductor be increased?
2. Define peptisation.
3. How is copper extracted from a low grade ore of it?
4. Which is a stronger reducing agent SbH_3 or BiH_3 , and why?
5. What happens when bromine attacks $\text{CH}_2 = \text{CH} - \text{CH}_2 - \text{C} \equiv \text{CH}$?
6. Write the IUPAC name of the following?



7. Write the structure obtained when glucose is oxidized with nitric acid?
8. Differentiate between disinfectants and antiseptics?
9. Express the relation among cell constant, resistance of the solution in the cell and conductivity of the solution. How is molar conductivity of a solution related to its conductivity?

OR

The molar conductivity of a 1.5M solution of an electrolyte is found to be $138.9 \text{ Scm}^2\text{mol}^{-1}$. Calculate the conductivity of this solution.

10. A reaction is of second order with respect to a reactant. How is its rate affected if the concentration of the reactant is (i) doubled (ii) reduced to half?
11. Which methods are usually employed for purifying the following metals:
 - a) Nickel
 - b) GermaniumMention the principle behind each one of them.

12. Explain the following facts giving appropriate reason in each case:
- NF_3 is an exothermic compound whereas NCl_3 is not.
 - All the bonds in SF_4 are not equivalent.
13. Complete the following chemical reaction equations:
- $\text{Cr}_2\text{O}_7^{2-} + \text{I}^- + \text{H}^+ \longrightarrow$
 - $\text{MnO}_4^- + \text{NO}_2^- + \text{H}^+ \longrightarrow$
14. Explain the mechanism of acid catalyzed hydration of an alkene to form corresponding alcohol.
15. Explain the following behaviors:
- Alcohols are more soluble in water than the hydrocarbons of comparable molecular masses.
 - Ortho- nitrophenol is more acidic than the ortho- methoxyphenol.
16. Describe the following giving the relevant chemical equation in each case:
- Carbylamine reaction
 - Hofmann's bromamide reaction
17. Complete the following reaction equations:
- $\text{C}_6\text{H}_5\text{N}_2\text{Cl} + \text{H}_3\text{PO}_2 + \text{H}_2\text{O} \longrightarrow$
 - $\text{C}_6\text{H}_5\text{NH}_2 + \text{Br}_2 (\text{aq}) \longrightarrow$
18. What are food preservatives/ name two such substances.
19. Copper crystallizes with face centered cubic unit cell. If the radius of copper atom is 127.8pm, calculate the density of copper metal.
(Atomic mass of Cu = 63.55u and Avogadro's no. = $6.02 \times 10^{23} \text{ mol}^{-1}$)
- OR
- Iron has a body centered cubic unit cell with the cell dimension of 286.65pm. Density of iron is 7.87 g cm^{-3} . Use this information to calculate Avogadro's number. (Atomic mass of Fe = 56u)
20. The electrical resistance of a column of 0.05M NaOH solution of diameter 1cm and length 50cm is $5.55 \times 10^3 \text{ ohm}$. Calculate its resistivity, conductivity and molar conductivity.
21. Smoke is colloidal solution of solid particles such as Carbon, arsenic compounds, dust, etc. in air. Precipitation of smoke particles coming from the chimney of factories is carried out by Cottrell Precipitator and Carbon free air passes out through the chimney.
- Name the principle used in the Cottrell Precipitator.
 - How smoke precipitator causes precipitation and settling of smoke particles.
 - Name the value learnt by the use of this Cottrell Precipitator.
22. Explain the following terms giving a suitable example for each:
- Aerosol
 - Emulsion
 - Micelle
23. How would you account for the following:

- a) Among lanthanides, Ln (III) compounds are predominant. However, occasionally in solutions or in solid compounds, +2 and +4 ions are also obtained.
- b) The $E^\circ_{M^{2+}/M}$ for copper is positive (0.34 V). Copper is the only metal in the first series of transition elements showing this behavior.
- c) The metallic radii of the third (5d) series of transition metals are nearly the same as those of the corresponding members of the second series.
24. Name the following coordination entities and draw the structures of their stereo isomers:
- a) $[\text{Co}(\text{en})_2\text{Cl}_2]^+$
- b) $[\text{Cr}(\text{C}_2\text{O}_4)_3]^{3-}$
- c) $[\text{Co}(\text{NH}_3)_3\text{Cl}_3]$
25. Answer the following questions:
- a) What is meant by chirality of a compound? Give an example.
- b) Which one of the following compounds is more easily hydrolyzed by KOH and why?
 $\text{CH}_3\text{CHClCH}_2\text{CH}_3$ or $\text{CH}_3\text{CH}_2\text{CH}_2\text{Cl}$
- c) Which one undergoes $\text{S}_\text{N}2$ substitution reaction faster and why?
 $\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{CH}_2 - \text{CH}_2 - \text{I}$ or
 $\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{CH}_2 - \text{CH}_2 - \text{Cl}$
26. What is essentially the difference between α -glucose and β -glucose? What is meant by pyranose structure of glucose?
27. Differentiate between thermoplastic and thermosetting polymers. Give one example of each.
28. (i) Define the following terms:
- a) Mole fraction
- b) Ideal solution
- (ii) 15g of an unknown molecular material is dissolved in 450g of water. The resulting solution freezes at -0.34°C . What is the molar mass of the material? (K_f for water = $1.86 \text{ K kg mol}^{-1}$)

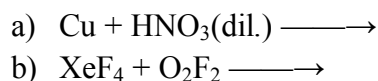
OR

- (i) Explain the following:
- a) Henry's law about dissolution of a gas in a liquid.
- b) Boiling point elevation constant for a solvent.
- (ii) A solution of glycerol ($\text{C}_3\text{H}_8\text{O}_3$) in water was prepared by dissolving some glycerol in 500g of water. This solution has a boiling point of 100.42°C . What mass of glycerol was dissolved to make this solution? (K_b for water = $0.512 \text{ K kg mol}^{-1}$)
29. (i) Draw the molecular structures of the following compounds:
- a) N_2O_5

- b) XeOF_4
- (ii) Explain the following observations:
- Sulphur has a greater tendency for catenation than oxygen.
 - ICl is more reactive than I_2 .
 - Despite lower value of its electron gain enthalpy with negative sign, fluorine (F_2) is a stronger oxidizing agent than Cl_2 .

OR

- (i) Complete the following equations:



- (ii) Explain the following observations:

- Phosphorus has greater tendency for catenation than nitrogen.
 - Oxygen is a gas but sulphur a solid.
 - The halogens are coloured. Why?
30. (i) Write a suitable chemical equation to complete each of the following transformations:
- Butan-1-ol to butanoic acid
 - 4-methylacetophenone to benzene-1,4-dicarboxylic acid

(ii) An organic compound with molecular formula $\text{C}_9\text{H}_{10}\text{O}$ forms 2, 4- DNP derivative, reduces Tollen's reagent and undergoes Cannizzaro's reaction. On vigorous oxidation, it gives 1, 2-benzenedicarboxylic acid. Identify the compound.

OR

- (i) Give chemical tests to distinguish between

- Propanol and Propanone
- Benzaldehyde and Acetophenone

(ii) Arrange the following compounds in an increasing order of their property as indicated:

- Acetaldehyde, Acetone, Methyl-tert-butyl ketone (reactivity towards HCN)
- Benzoic acid, 3,4-dinitrobenzoic acid, 4-methoxybenzoic acid (acid strength)
- $\text{CH}_3\text{CH}_2\text{CH}(\text{Br})\text{COOH}$, $\text{CH}_3\text{CH}(\text{Br})\text{CH}_2\text{COOH}$, $(\text{CH}_3)_2\text{CHCOOH}$ (acid strength)

X-----X-----X-----X-----X-----X

DELHI PUBLIC SCHOOL, BAHADURGARH

CLASS: XII Sample Paper

SUBJECT: CHEMISTRY (SET-2)

TIME: 3hours

M.MARKS: 70

GENERAL INSTRUCTIONS:

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

1. What is meant by 'doping' in a semiconductor?
2. What is the role of graphite in the electrometallurgy of aluminium?
3. Which one of PCl_4^+ and PCl_4^- is not likely to exist and why?
4. Give the IUPAC name of the following compound:
$$\begin{array}{c} \text{CH}_2 = \text{C} - \text{CH}_2\text{Br} \\ | \\ \text{CH}_3 \end{array}$$
5. Draw the structural formula of 2-methylpropan-2-ol molecule.
6. Arrange the following compounds in an increasing order of their reactivity in nucleophilic addition reactions: ethanol, propanal, propanone, butanone.
7. Arrange the following in the decreasing order of their basic strength in aqueous solutions: CH_3NH_2 , $(\text{CH}_3)_2\text{NH}$, $(\text{CH}_3)_3\text{N}$ and NH_3
8. Define the term 'homopolymerisation' giving an example.
9. An aqueous solution of trichloroacetic acid (CCl_3COOH) is heated to its boiling point. The solution has the boiling point of 100.18°C . Determine the molality of the solution. (K_b for water = $0.512 \text{ K kg mol}^{-1}$)

OR

Define the following terms:

- a) Mole fraction
- b) Isotonic solution
- c) Van't Hoff factor
- d) Ideal solution

10. What do you understand by the 'order of a reaction'? Identify the reaction order from each of the following units of reaction rate constant:
- $L^{-1} \text{ mol s}^{-1}$
 - $L \text{ mol}^{-1} \text{ s}^{-1}$
11. Name the two groups into which phenomenon of catalysis can be divided. Give an example of each group with the chemical equation involved.
12. What is meant by coagulation of a colloidal solution? Describe briefly any three methods by which coagulation of lyophobic sols can be carried out.
13. Describe the principle involved in each of the following processes:
- Mond process for refining of Nickel
 - Column chromatography for purification of rare elements
14. Explain the following giving an appropriate reason in each case:
- O_2 and F_2 both stabilize higher oxidation states of metals but O_2 exceeds F_2 in doing so.
 - Structures of xenon fluorides cannot be explained by Valence Bond approach.
15. Complete the following chemical equations:
- $Cr_2O_7^{2-} + I^- + H^+ \longrightarrow$
 - $MnO_4^- + NO_2^- + H^+ \longrightarrow$
16. What is meant by (i) peptide linkage (ii) biocatalysis?
17. Write any two reactions of glucose which cannot be explained by the open chain structure of glucose molecule.
18. Draw the structure of the monomer for each of the following polymers:
- Nylon-6
 - Polypropene
19. Tungsten crystallizes in body centered cubic unit cell. If the edge of the unit cell is 316.5pm, what is the radius of tungsten atom?

OR

Iron has a body centered cubic unit cell with a cell dimension of 286.65pm. The density of iron is 7.874 g cm^{-3} . Use this information to calculate Avogadro's number. (Atomic mass of Fe = 55.845u)

20. Calculate the amount of KCl which must be added to 1kg of water so that the freezing point is depressed by 2K. (K_f for water = $1.86 \text{ K kg mol}^{-1}$)
21. For the reaction, $2NO(g) + Cl_2(g) \longrightarrow 2NOCl(g)$
the following data were collected. All the measurements were taken at 263K:

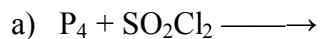
Experiment	Initial [NO] (M)	Initial [Cl ₂] (M)	Initial rate of disappearance of Cl ₂ (M/min)
1	0.15	0.15	0.6
2	0.15	0.3	1.2
3	0.3	0.15	2.4
4	0.25	0.25	?

- a) Write the expression for rate law.
 b) Calculate the value of rate constant and specify its units.
 c) What is the initial rate of disappearance of Cl_2 in experiment 4?
22. How would you account for the following:
 a) Many of the transition elements are known to form interstitial compounds.
 b) The metallic radii of the third (5d) series of transition metals are virtually the same as those of the corresponding group members of the second (4d) series.
 c) Lanthanides form primarily +3 ions, while actinides usually have higher oxidation states in their compounds, +4 or even +6 being typical.
23. Give the formula of each of the following coordination entities:
 a) Co^{3+} ion is bound to one Cl^- , one NH_3 molecule and two bidentate ethylene diamine (en) molecules.
 b) Ni^{2+} ion is bound to two water molecules and two oxalate ions.
 Write the name and magnetic behavior of each of the above coordination entities.
 (Atomic no. of Co = 27, Ni = 28)
24. Although chlorine is electron withdrawing group, yet it is ortho-, para- directing in electrophilic aromatic substitution reactions. Explain why it is so?
25. Draw the structure and name the product formed if the following alcohols are oxidized. Assume that an excess of oxidizing agent is used.
 a) $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{OH}$
 b) 2-butanol
 c) 2-methyl-1-propanol
26. Write chemical equations for the following conversions:
 a) Nitrobenzene to benzoic acid
 b) Benzyl chloride to 2-phenylethanamine
 c) Aniline to benzyl alcohol
27. What are the following substances? Give one example of each one of them.
 a) Tranquilizers
 b) Food preservatives
 c) Synthetic detergents
28. (i) What type of a battery is the lead storage battery? Write the anode and the cathode reactions and the overall reaction occurring in a lead storage battery, when current is drawn from it.
 (ii) In the button cell, widely used in watches, the following reaction takes place:

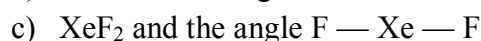
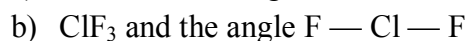
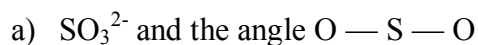
$$\text{Zn(s)} + \text{Ag}_2\text{O(s)} + \text{H}_2\text{O(l)} \longrightarrow \text{Zn}^{2+}(\text{aq}) + 2\text{Ag(s)} + 2\text{OH}^-(\text{aq})$$
 Determine E° and ΔG° for the reaction.
 $[E^\circ_{(\text{Ag}^+/\text{Ag})} = +0.80\text{V}; E^\circ_{(\text{Zn}^{2+}/\text{Zn})} = -0.76\text{V}]$
- OR
- (i) Define molar conductivity of a solution and explain how molar conductivity changes with change in concentration of solution for a weak and a strong electrolyte.

(ii) The resistance of a conductivity cell containing 0.001M KCl solution at 298K is 1500Ω. What is the cell constant if the conductivity of 0.001M KCl solution at 298K is $0.146 \times 10^{-3} \text{ Scm}^{-1}$?

29. (i) Complete the following chemical reaction equations:

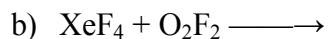
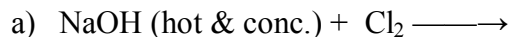


(ii) Predict the shape and the asked angle (90° or more or less) in each of the following cases:

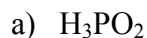


OR

(i) Complete the following chemical reactions:



(ii) Draw the structures of the following molecules:



30. (i) Illustrate the following name reactions giving suitable examples in each case:

a) Clemmensen reduction

b) Hell-Volhard-Zelinsky reaction

(ii) How are the following conversions carried out?

a) Ethylcyanide to ethanoic acid

b) Butan-1-ol to butanoic acid

c) Benzoic acid to m-bromobenzoic acid

OR

(i) Illustrate the following name reactions giving suitable examples in each case:

a) Cross-aldol condensation

b) Decarboxylation

(ii) Give simple tests to distinguish between the following pair of compounds:

a) Pentan-2-one to Pentan-3-one

b) Benzaldehyde and Acetophenone

c) Phenol to benzoic acid

X-----X-----X-----X-----X-----X-----X

