SAMPLE PAPER 1

Class 12 - Chemistry

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

General Instructions:

Read the following instructions carefully.

1. There are **35** questions in this question paper with internal choice.

2. SECTION A consists of 18 multiple-choice questions carrying 1 mark each.

3. SECTION B consists of 7 very short answer questions carrying 2 marks each.

4. SECTION C consists of 5 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.**

Section A

1. Which of the following reagents may be used to identify glucose?   **[1]**

    a) CHC_{13} and KOH (ale.)   b) Ammoniacal $AgNO_3$ solution

    c) Neutral $FeCl_3$ solution   d) $NaHSO_3$

2. When a lead storage battery is discharged, then: **[1]**

    a) lead is formed   b) SO_2 is evolved

    c) lead sulphate is consumed   d) sulphuric acid is consumed

3. The process of converting alkyl halides into alcohols involves _____.   **[1]**

    a) substitution reaction   b) addition reaction

    c) rearrangement reaction   d) dehydrohalogenation reaction

4. The increasing order of hydrolysis of the following compounds is: **[1]**

    a) I < II < IV < III   b) I < IV < II < III

    c) I < II < III < IV   d) IV < III < II < I

5. The order of stability of +6 oxidation state for group VI follows the order: **[1]**

    a) Cr > Mo > W   b) Cr < Mo < W

    c) Mo > Cr > W   d) W < Cr > Mo

6. Which of the following given reaction is correct? **[1]**

    a) C_2H_5OH, iodine with NaOH gives iodoform.

    b) Sucrose on reaction with NaCl give invert sugar.

    c) Any aldehyde gives secondary alcohol on reduction.

    d) Reaction of vegetable oil with H_2SO_4 gives glycerine.

7. A cucumber placed in brine solution _____. **[1]**

    a) swells as it loses water due to reverse osmosis

    b) shrivels as it loses water due to osmosis

    c) shrivels as it absorbs water due to reverse osmosis

    d) swells as it absorbs water due to osmosis

8. An electric current of c ampere was passed through a solution of an electrolyte for t second depositing P g of metal M on the cathode. The equivalent weight E of the metal will be: **[1]**

    a) $E = \frac{c \times t}{P \times 96500}$

    b) $E = \frac{96500 \times P}{c \times t}$

    c) $E = \frac{c \times P}{t \times 96500}$

    d) $E = \frac{c \times t \times 9650}{P}$

9. Which is not required condition for the two liquids to form ideal solutions? **[1]**

    a) $P_{M\ exp} = P_{M\ Roult\ law}$

    b) $\Delta H_{mixing} = 0$

    c) $\Delta S_{mix} = 0$

    d) $\Delta V_{mixing} = 0$

10. **[1]**
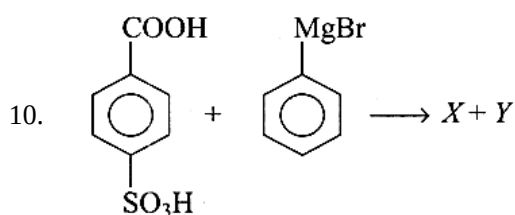
X and Y are respectively:

    a) only

    b)

    c) None of these

    d)
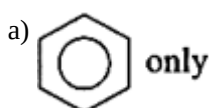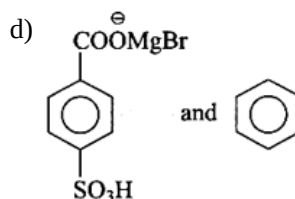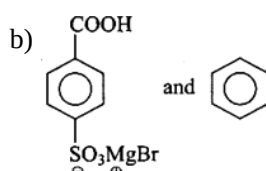
11. Night blindness is caused by the deficiency of **[1]**

    a) Vitamin D

    b) Vitamin B

    c) Vitamin C

    d) Vitamin A

12. The lanthanoid contraction is responsible for the fact that: **[1]**

    a) Zr and Nb have similar oxidation state.

    b) Zr and Hf have about the same radius.

    c) Zr and Y have about the same radius.

    d) Zr and Zn have similar oxidation state.

13. Following mechanism has been proposed for a reaction **[1]**

$2A + B \rightarrow D + E$

$A + B \rightarrow C + D$ (slow)

$A + C \rightarrow E$ (fast)
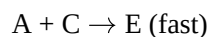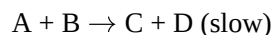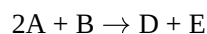
The rate law expression for the reaction is

a) $r = k[A]^2$

b) $r = k[A][B]$

c) $r = k[A][C]$

d) $r = k[A]^2[B]$

14. In a H_2 - O_2 fuel cell, combustion of hydrogen occurs and **[1]**

a) create potential difference between the two electrodes

b) produce high purity water

c) generate heat

d) remove adsorbed oxygen from electrode surface

15. **Assertion (A):** In comparison to ethyl chloride it is difficult to carry out nucleophilic substitution on vinyl chloride. **[1]**

Reason (R): Vinyl group is electron-donating.

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):** Glycerol does not react with HI. **[1]**

Reason (R): 2 - Iodopropane can be produced by treatment of glycerol with HI.

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.

17. **Assertion:** Elevation in boiling point for two isotonic solutions may not be the same. **[1]**

Reason: Boiling point depends upon the concentration.

a) Both assertion and reason are CORRECT and reason is the CORRECT explanation of the assertion.

b) Both assertion and reason are CORRECT but, reason is NOT THE CORRECT explanation of the assertion.

c) Assertion is CORRECT but, reason is INCORRECT.

d) Both assertion and reason are INCORRECT.

18. **Assertion (A):** For measuring the resistance of an ionic solution an AC source is used. **[1]**

Reason (R): Concentration of ionic solution will change if the DC source is used.

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

19. What is meant by hexadentate ligand? Give one example. How is such ligand useful for measuring hardness of water. **[2]**

20. Suggest a method for the preparation of phenyl acetic acid using a suitable Grignard reagent. **[2]**

OR

Write the steps for the conversion of Acetaldehyde to Acetone.

21. Write the IUPAC name and draw the structure of coordination entities of $[PtCl(NH_3)_5]Cl_3$. **[2]**

OR

Write all the geometrical isomers of $[Pt(NH_3) (Br) (Cl) (py)]$ and how many of these will exhibit optical isomers?

22. The rate constant for the first order decomposition of H_2O_2 is given by the following equation: **[2]**

$$\log k = 14.2 - \frac{1.0 \times 10^4}{T} K$$

Calculate E_a for this reaction and rate constant k if its half-life period be 200 min. (Given, R = 8.314 JK^{-1} mol^{-1})

23. Write the IUPAC name of the ionization isomer of $[Ni(NH_3)_5NO_3]Cl$. **[2]**

24. How is aminomethane obtained from ethanal (acetaldehyde)? **[2]**

25. What is denaturation and renaturation of proteins? **[2]**

Section C

26. What happens to most probable kinetic energy and the energy of activation with an increase in temperature? **[3]**

27. What happens when **[3]**

   i. ethyl chloride is treated with aqueous KOH,

   ii. methyl bromide is treated with sodium in the presence of dry ether,

   iii. methyl chloride is treated with KCN?

28. How are the following conversions carried out. **[3]**

   i. Ethanol to 1, 2-Ethanediol

   ii. Phenol to Acetophenone

29. While separating a mixture of ortho and para nitrophenols by steam distillation, name the isomer which will be steam volatile. Give reason. **[3]**

30. Monosaccharides contain carbonyl group hence are classified, as aldose or ketose. The number of carbon atoms present in the monosaccharide molecule is also considered for classification. In which class of monosaccharide will you place fructose? **[3]**

OR

Give a plausible explanation for the following:

   i. Glucose doesn't give a 2,4-DNP test.

   ii. The two strands in DNA are not identical but are complementary.

   iii. Starch and cellulose both contain glucose unit as monomer, yet they are structurally different.

Section D

31. **Read the text carefully and answer the questions:** **[4]**

Vapour pressure of a liquid or a solution is the pressure exerted by the vapour in equilibrium with the liquid or solution at a particular temperature. It depends upon the nature of the liquid and temperature. The non-volatile solute in solution reduces the escaping tendency of the solvent molecules in the vapour phase because some of the solute particles occupy the positions of the solvent molecules on the liquid surface. The relative lowering of the vapour pressure of a solution containing a non-volatile solute is equal to the mole fraction of the solute in the solution. This is also known as Raoult's law. However, for solutions of volatile solutes, the vapour pressure of a component in a solution at a given temperature is equal to the mole fraction of that component in the solution multiplied by the vapour pressure of that pure component. The solutions in which each component obeys Raoult's law is called an ideal solution. For ideal solutions ΔH_{mixing} and ΔV_{mixing} are also zero. Practically no

solution is ideal. A non-ideal solution is that solution in which solute and solvent molecules interact with one another with a different force than the forces of interaction between the molecules of the pure components. There are two types of non-ideal solutions, showing positive deviations and negative deviations from ideal behaviour. If for the two components A and B, the forces of interaction between A and B molecules are less than the A-A and B-B interactions, the non-ideal solutions have positive deviations. On the other hand, if the forces of interaction between A and B molecules are more than the A-A and B-B interactions, the non-ideal solutions have negative deviations.

 (i) What is the mole fraction of A in solution obeying result's low if the vapour pressure of a pure liquid A is 40 mm of Hg at 300 K. The vapour pressure of this liquid in solution with liquid B is 32 mm of Hg?

 (ii) Vapour pressure of a solution of heptane & octane is given by the equation:

    P(sol.)(mm Hg) = 35 + 65x, where x is the mole fraction of heptane. Calculate the vapour pressure of pure octane.

 (iii) What is the value of ΔV_{mixing} and ΔH_{mixing} for non-ideal solution showing negative deviation?

<div align="center">OR</div>

   Acetic acid + pyridine, the mixture is an example of which type of solution?

32. **Read the text carefully and answer the questions:**   **[4]**

The d-block of the periodic table contains the elements of the groups 3 to 12 and are known as transition elements. In general, the electronic configuration of these elements is (n - 1)d$^{1-10}$ ns$^{1-2}$. The d-orbitals of the penultimate energy level in their atoms receive electrons giving rise to the three rows of the transition metals i.e. 3d, 4d and 5d series. However, Zn, Cd and Hg are not regarded as transition elements. Transition elements exhibit certain characteristic properties like variable oxidation stables, complex formation, formation of coloured ions, alloys, catalytic activity etc. Transition metals are hard (except Zn, Cd and Hg) and have a high melting point.

 (i) Why are Zn, Cd and Hg non-transition elements?

 (ii) Which transition metal of 3d series does not show variable oxidation state?

 (iii) Why do transition metals and their compounds show catalytic activity?

<div align="center">OR</div>

   Why are melting points of transition metals high?

<div align="center">Section E</div>

33. Write IUPAC names of the following compounds and classify them into primary, secondary and tertiary amines. **[5]**

 1. $(CH_3)_2CHNH_2$

 2. $CH_3(CH_2)_2NH_2$

 3. $CH_3NHCH(CH_3)_2$

 4. $(CH_3)_3CNH_2$
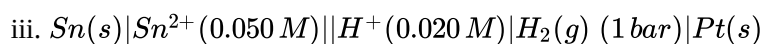
 5. $C_6H_5NHCH_3$

<div align="center">OR</div>

Write the reactions of

 i. aromatic and

 ii. aliphatic primary amines with nitrous acid.

34. Write the Nernst equation and emf of the following cells at 298 K: **[5]**

 i. $Mg(s)|Mg^{2+}(0.001\,M)||Cu^{2+}(0.0001\,M)|Cu(s)$

 ii. $Fe(s) \mid Fe^{2+}(0.001\,M) \mid\mid H^+(1M) \mid H_2(g)(1bar)|Pt(s)$

iii. $Sn(s)|Sn^{2+}(0.050\,M)||H^+(0.020\,M)|H_2(g)\,(1\,bar)|Pt(s)$

iv. $Pt(s)|Br_2(l)|Br^-(0.010\,M)\,||\,H^+(0.030M)|H_2(g)\,(1\,bar)|Pt(s)$

<center>OR</center>

a. What is Nickel Cadmium cell? State its one merit over lead storage cell. Write the overall reaction that occurs during discharging of this cell.

b. Silver is electro deposited on a metallic vessel of total surface area 900 cm^2 by passing a current of 0.5 ampere for 2 hours.

   Calculate the thickness of silver deposited, given its density is 10.5gcm^{-3}. (At. mass of Ag = 108 g mol^{-1}).
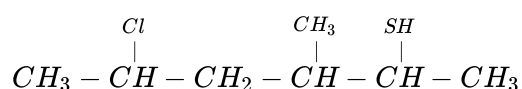
35. Answer the following questions: **[5]**

   (i) The rate of reaction $X \rightarrow Y$ becomes 8 times when the concentration of the reactant X is doubled. Write the rate law of the reaction.

   (ii) How is excess of copper and iron removed from body?

   (iii) Write IUPAC name of :-

$$CH_3 - \underset{\underset{Cl}{|}}{C}H - CH_2 - \underset{\underset{CH_3}{|}}{C}H - \underset{\underset{SH}{|}}{C}H - CH_3$$

   (iv) Write a short note on coupling reactions.

   (v) What is the most common oxidation state of lanthanoids and actinoids?