Model Question Paper
Chemistry
Class XII

Time Allowed : 3 hours | Max. Marks 60

General Instructions:

1. All questions are compulsory.
2. Marks for each question are indicated against it.
3. Q 1 to 10 are multiple choice questions and carry one mark each.
4. Q 11 to 20 carry two marks each.
5. Q 21 to 25 carry three marks each.
6. Q 26 to 28 carry five marks each.
7. Internal choice is given wherever applicable.

Q.1 Which of the following is an amorphous solid ?

i) Diamond ii) Quartz glass
iii) Polymers iv) Silicon carbide (1)

Q.2 At equilibrium the rate of dissolution of a solid solute in a volatile liquid solvent is _____.

i) Less than the rate of crystallisation ii) Greater than the rate of crystallisation
iii) Equal of the rate of crystallisation iv) Zero (1)

Q3. The term 'sorption' stands for _____

i) Absorption ii) Adsorption
iii) Both absorption and adsorption iv) Desorption (1)

Q.4 The commercial name of polyacrylonitrile is _____.

i) Dacron ii) Orlon (acrilan)
iii) PVC iv) Bakelite (1)

Q.5 The correct IUPAC name of ($[Pt(NH_3)_2Cl_2]$ is

I) diamminedichloridoplatinum (II) ii) diamminedichloridoplatinum (IV)
iii) diamminedichloridoplatinum (0) iv) dichloridodiammineplatinum (IV) (1)

Q.6 Which statement about aspirin is not true.

i) Aspirin belongs to non-narcotic analgesics.

ii) It is effective in relieving pain.

iii) It has anti-blood clotting action.

iv) It is a neurologically active drug. (1)

Q.7 PH_3 forms bubbles when passed slowly in water but NH_3 dissolves. It is because of

i) Hydrogen bonding between ammonia and water.

ii) Hydrogen bonding between phosphine and water.

iii) Coordinate bonding between phosphine and ammonia.

iv) Van der Waal's forces between ammonia and water. (1)

Q.8 IUPAC name for $CH_3 - \overset{\overset{O}{\|}}{C} - CH_2 - \overset{\overset{OH}{|}}{CH} - CHO$ is

I) 5-Oxo-4-hydroxypentan-2-one ii) 4-Hydroxy-5-al-2-pentanone

iii) 2-Hydroxy-4-oxopentanal iv) 1-al-4-oxo-pentan-2-ol (1)

Q.9 Which of the following compounds can be used as antifreeze in automobile radiators?

i) Methyl alcohol ii) Glycol

iii) Nitrophenol iv) Ethyl alcohol (1)

Q.10 Deficiency of which vitamin causes poor coagulation of blood ?

i) Vitamin K ii) Vitamin A

iii) Vitamin C iv) Vitamin B (1)

Q.11 Explain why conductivity of germanium crystals increases on doping with gallium ? What type of semiconductor is obtained by this process ? (2)

Q.12 Derive an expression to calculate time required for completion of first order reaction. (2)

Q.13 The initial concentration of N_2O_5 in the following first order reaction $N_2O_5(g) \rightarrow 2\,NO_2(g) + 1/2O_2(g)$ was 1.24×10^{-2} mol L^{-1} at 318 K. The concentration of N_2O_5 after 60 minutes was 0.20×10^{-2} mol L^{-1}. Calculate the rate constant of the reaction at 318K. (2)

Q.14 Differentiate between Physisorption and Chemisorptions (four differences only) (2)

Q.15 Write two basic requirements for refining of a metal by Van-Arkel Method. (2)

Q.16 Write the balanced chemical equation for the reaction of Cl_2 with hot and concentrated NaOH. Is this reaction a disproportionation reaction ? Justify.

Q.17 Using the valence bond theory, predict the shape and magnetic character of $\left[Ni(CN)_4\right]^{2-}$ ion. (2)

Q.18 a) C_6H_5CHO + conc. NaOH ⟶ _____ + _____ (Give products.)

b) On warming acetaldehyde with freshly prepared ammonical silver nitrate solution, a bright silver mirror is produced. Write chemical equation. (1+1)

Q.19 Write short notes on the following :

i) Coupling reaction ii) Gabriel phthalimide synthesis (1+1)

Q.20 Write equations for the synthesis of the given polymers.

i) Glyptal ii) Teflon (1+1)

Q.21 a) Derive the expression for determination of Molar mass of a non- volatile solute from depression in freezing point.

b) 4 g of NaOH are present in one litre of solution. Calculate Molarity of solution. (2+1)

Q.22 How is H_2SO_4 manufactured by Contact process ? Write all the steps involved in the preparation. (3)

OR

i) Why ICI is more reactive than I_2 ?

ii) Draw the structure of XeO_3.

iii) Oxygen exhibits only - 2 oxidation state in most of its compounds while other members of this family show + 4 and + 6 oxidation state as well. Explain why is it so ? (1+1+1)

Q.23 i) Write a short note on Finkelstein reaction.

ii) Why is the solubility of haloalkanes in water very low ?

iii) How will you convert iso-propyl bromide to n-propyl bromide ? (1+1+1)

Q.24 a) Explain why *p*-nitrophenol is more acidic than phenol.

b) $C_6H_5OH + Zn \rightarrow$ _____ + _____. (Predict the products)

c) How will you distinguish between phenol and ethanol ? (1+1+1)

Q.25 a) Write a short note on Wolf-Kishner reduction reaction.

b) Arrange the following in decreasing order of their acidic strength.

CH_3CH_2OH, $ClCH_2COOH$, FCH_2COOH, CH_3COOH

c) How will you convert Benzoic acid to Benzaldehyde ? (1+1+1)

OR

An organic compound (A) with molecular formula C_8H_8O forms an orangered precipitate with 2,4-DNP reagent and gives yellow precipitate on heating with iodine in the presence of sodium hydroxide. It neither reduces Tollens' or Fehlings' reagent, nor does it decolourise bromine water or Baeyer's reagent. On drastic oxidation with chromic acid, it gives a carboxylic acid (B) having molecular formula $C_7H_6O_2$. Identify the compounds (A) and (B) and explain the reactions involved. (3)

Q.26 (a) Discuss the working of lead storage cell giving reactions that are taking place during discharging operation.

(b) What do you mean by E.M.F. of a cell ? Calculate the E.M.F. of the cell : $Mg(s) | Mg^{2+}(0.2M) || Ag^{+}(0.001\ M) / Ag(s)$. Given that : $E^0_{(Ag^+/Ag)} = +0.80V$, $E^0_{(Mg^{2+}/Mg)} = -2.37V$

(c) State Faraday's first law of electrolysis. (2+2+1)

Q.27 (a) What happens when :

i) $K_2Cr_2O_7$ reacts with an acidified solution of $FeSO_4$?

ii) $KMnO_4$ reacts with an acidified solution of KI ?

(b) Explain the following :

i) The Second and third rows of transition elements resemble each other much more than they resemble the first row. Explain why?

ii) Why first ionisation enthalpy of Cr is lower than that of Zn ?

iii) Why transition metal ions show magnetic properties ? (2+3)

Q.28 a) Compare the relative basic strength of Primary, secondary and tertiary amines in aqueous solutions.

b) Differentiate between DNA and RNA.

c) What is meant by zwitter ion ? (2+2+1)

Model Question Paper - Answer Key
Chemistry
Class XII

Q.1 Which of the following is an amorphous solid ?

i) Diamond **ii) Quartz glass**
iii) Polymers **iv) Silicon carbide**

Ans. (iii) Polymers

Q.2 At equilibrium the rate of dissolution of a solid solute in a volatile liquid solvent is .....

i) Less than the rate of crystallisation **ii) Greater than the rate of crystallisation**
iii) Equal to the rate of crystallisation **iv) Zero**

Ans. Equal of the rate of crystallisation

Q3. The term 'sorption' stands for _____

i) Absorption **ii) Adsorption**
iii) Both absorption and adsorption **iv) Desorption**

Ans. iii) Both absorption and adsorption

Q.4 The commercial name of polyacrylonitrile is _____.

i) Dacron **ii) Orlon (acrilan)**
iii) PVC **iv) Bakelite**

Ans. ii) Orlon (acrilan)

Q.5 The correct IUPAC name of ($[Pt(NH_3)_2Cl_2]$ is

i) diamminedichloridoplatinum (II) **ii) diamminedichloridoplatinum (IV)**
iii) diamminedichloridoplatinum (0) **iv) Dichloridodammineplatinum (IV)**

Ans. ii) diamminedichloridoplatinum (II)

Q.6 Which statement about aspirin is not true.

i) Aspirin belongs to non-narcotic analgesics
ii) It is effective in relieving pain.
iii) It has anti-blood clotting action.
iv) It is a neurologically active drug.

Ans. iv) It is a neurologically active drug.

Q.7 **PH_3 forms bubbles when passed slowly in water but NH_3 dissolves. It is because of**

i) **Hydrogen bonding between ammonia and water.**

ii) **Hydrogen bonding between phosphine and water.**

iii) **Coordinate bonding between phosphine and ammonia.**

iv) **Van der Waal's forces between ammonia and water.**

Ans. i) Hydrogen bonding between ammonia and water.

Q.8 **IUPAC name for** $CH_3 - \overset{\overset{O}{\|}}{C} - CH_2 - \overset{\overset{OH}{|}}{CH} - CHO$ **is**

i) **5-Oxo-4-hydroxypentan-2-one** **ii)** **4-Hydroxy-5-al-2-pentanone**

iii) **2-Hydroxy-4-oxopentanal** **iv)** **1-al-4-oxo-pentan-2-ol**

Ans. iii) 2-Hydroxy-4-oxopentanal

Q.9 **Which of the following compounds can be used as antifreeze in automobile radiators ?**

i) **Methyl alcohol** **ii)** **Glycol**

iii) **Nitrophenol** **iv)** **Ethyl alcohol**

Ans. ii) Glycol

Q.10 **Deficiency of which vitamin causes poor coagulation of blood ?**

i) **Vitamin K** **ii)** **Vitamin A**

iii) **Vitamin C** **iv)** **Vitamin B**

Ans. i) Vitamin K

Q.11 **Explain why conductivity of germanium crystals increases on doping with gallium ? What type of semiconductor is obtained by this process ?** **(2)**

Ans. It is because gallium is electron deficient element which belongs to group 13 elements; therefore it produces holes (vacant sites) upon doping the germanium crystal due to only three valence electrons, where electrons can jump from other sites to increase the conductivity of the crystal.

This process gives rise to p-type semiconductor.

Q.12 **Derive an expression to calculate time required for completion of first order reaction.** (2)

Ans. In this class of reactions, the rate of the reaction is proportional to the first power of the concentration of the reactant R. For example.

$R \rightarrow P$

$$\text{Rate} = -\frac{d[R]}{dt} = k(R)$$

$$\text{Or } \frac{d[R]}{[R]} = -k dt$$

Integrating this equation. We get

In [R] $= -kt + 1$ _____ eq. (1)

Again, I is the constant of integration and its value can be determined easily.

When t = 0, R = $[R]_0$ where $[R]_0$ is the initial concentration of the reactant.

Therefore, equation (1) can be written as

In $[R]_0 = -k \times 0 + 1$

In $[R]_0 = I$

Substituting the value of I in equation (1)

In [R] $= -kt + \text{In}[R]_0$ _____ eq. (2)

Rearranging this equation

$$\text{In } \frac{[R]}{[R]_0} = -kt$$

or

$$k = \frac{1}{t} In \frac{[R]_0}{[R]}$$

Q.13 The initial concentration of N_2O_5 in the following first order reaction $N_2O_5(g) \rightarrow 2NO_2(g) + 1/2O_2(g)$ was 1.24×10^{-2} mol L^{-1} at 318 K. The concentration of N_2O_5 after 60 minutes was 0.20×10^{-2} mol L^{-1}. Calculate the rate constant of the reaction at 318K. (2)

Ans. For a first order reaction

$$\log \frac{[R]_1}{[R]_2} = \frac{K(t_2 - t_1)}{2.303}$$

$$k = \frac{2.303}{(t_2 - t_1)} \log \frac{[R]_1}{[R]_2}$$

$$= \frac{2.303}{(60 \text{ min} - 0 \text{ min})} \log \frac{1.24 \times 10^{-2} \text{ mol L}^{-1}}{0.20 \times 10^{-2} \text{ mol L}^{-1}}$$

$$= \frac{2.303}{60} \log 6.2 \text{ min}^{-1}$$

$$k = 0.0304 \text{ min}^{-1}$$

(7)

Q.14 Differentiate between Physisorption and Chemisorption (Four differences only) **(2)**

Ans.

S.No.	PHYSICAL ADSORPTION	CHEMICAL ADSORPTION
1.	Molecules are held by weak van der waal's forces	Molecules are held by chemical bonds
2.	Heat of adsorption are in the range of 20-40 KJ / mol.	Heat of adsorption are in the range of 40-400 KJ/mol.
3.	It is reversible	It is irreversible
4.	Form multilayer on the surface of adsorbent	Forms unimolecular layer.

Q.15 Write two basic requirements for refining of a metal by Van-Arkel Method. **(2)**

Ans. i) The metal should form a volatile compound with an available reagent.

ii) The volatile compound should be easily decomposable, so that the recovery is easy.

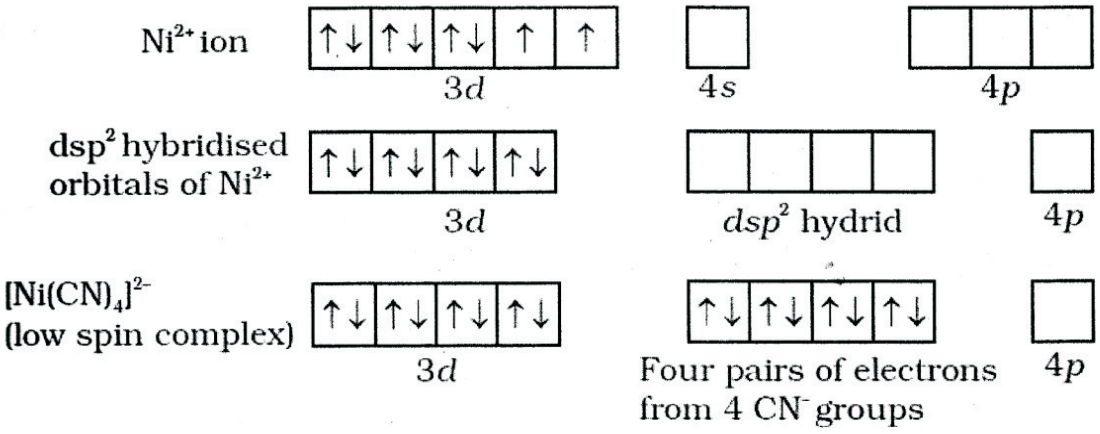
Q.16 Write the balanced chemical equation for the reaction of Cl_2 with hot and concentrated NaOH. Is this reaction a disproportionation reaction ? Justify. (2)

Ans. $3Cl_2 + 6NaOH \rightarrow 5NaCl + NaClO_3 + 3H_2O$

Yes, this reaction is a disproportionation reaction as chlorine is changed from zero oxidation state in Cl_2 to – 1 oxidation state in NaCl and + 5 in $NaClO_3$.

Q.17 Using the valence bond theory, predict the shape and magnetic character of $[Ni(CN)_4]^{2-}$ ion. (2)

Ans. We know that outermost electronic configuration of Ni is $3d^8\ 4s^2$. In this ion, nickel is in + 2 oxidation state and has the electronic configuration $3d^8$. The hybridisation takes place as :



Each of the hybridised orbital receives a pair of electrons from a cyanide ion. The compound is diamagnetic as there is absence of unpaired electron. Complex ion is low spin complex. The hybridisation is dsp^2, therefore the complex ion has square planar geometry.

Q.18 a) **C_6H_5CHO + conc. NaOH → _____ + _____ (Give products.)**

b) **On warming acetaldehyde with freshly prepared ammonical silver nitrate solution, a bright silver mirror is produced. Write chemical equation.**

(1+1)

Ans. a) $C_6H_5CHO + \text{conc. } NaOH \rightarrow HCOONa + CH_3OH$

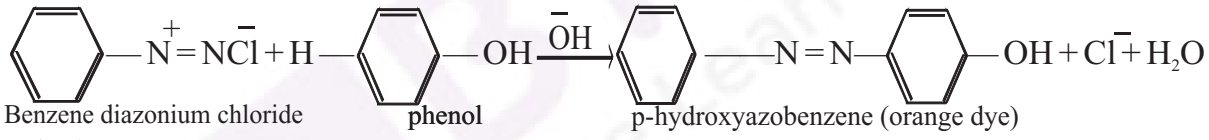
b) $2[Ag(NH_3)_2]^+ + 3OH^- + CH_3-\overset{O}{\overset{\|}{C}}-H \rightarrow 2Ag(s) + CH_3-\overset{O}{\overset{\|}{C}}-O^- + NH_4^+ + 4NH_3 + 2H_2O$

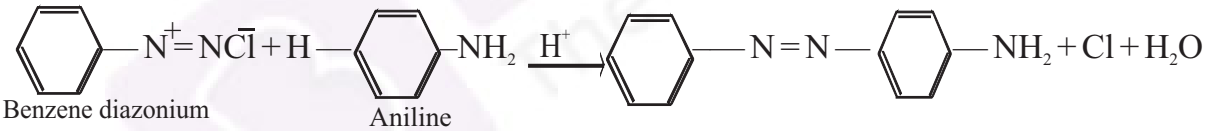
(Silver mirror)

Q.19 Write short notes on the following :

i) Coupling reaction ii) Gabriel phthalimide synthesis (1+1)

Ans. Benzene diazonium chloride reacts with phenol or aniline in which the phenol or aniline molecule at its para position is coupled with the diazonium salt to form p-hydroxyazobenzene or p-aminoazobenzene. This type of reaction is known as coupling reaction.

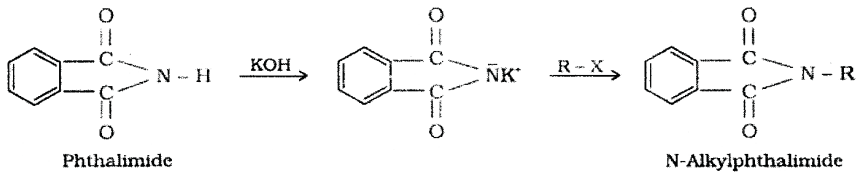


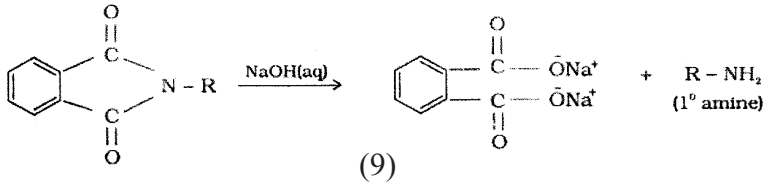


p – Aminoazobenzene

(yellow dye)

ii) Gabriel synthesis is used for the preparation of primary amines in which Phthalimide on treatment with ethanolic potassium hydroxide forms potassium salt of phthalimide which on heating with alkyl halide followed by alkaline hydrolysis produces the corresponding primary amine.

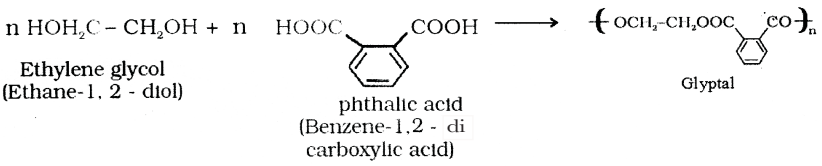




Q.20 Write equations for the synthesis of the given polymers.

i) Glyptal ii) Teflon (1+1)

Ans. (i)



(ii) $n\ CF_2 = CF_2 \xrightarrow[\text{High pressure}]{\text{Catalyst}} \left[CF_2 - CF_2\right]_n$

Tetrafluoroethene Teflon

Q.21 a) Derive the expression for determination of Molar mass of a non-volatile solute from depression in freezing point.

b) 4 g of NaOH are present in one litre of solution. Calculate Molarity of solution. (2+1)

Ans. a) $\Delta T_f \alpha\ m$

$\Delta T_f = K_f\ m$ ....(1)

If w_2 gram of the solute having molar mass as M_2, present in w_1 gram of solvent, produces the depression in freezing point ΔT_f of the solvent then molality of the solute is given by.

$$m = \frac{w_2 / M_2}{w_1/1000}$$

Substituting this value of molality in equation (1) we get

$$\Delta T_f = \frac{K_f \times w_2 / M_2}{w_1/1000}$$

$$\Delta T_f = \frac{K_f \times W_2 \times 1000}{M_2 \times w_1}$$

$$M_2 = \frac{K_f \times w_2 \times 1000}{\Delta T_f \times w_1}$$

b) We know that

Molarity = number of moles of solute /volume of solution in (L)

Number of moles = $4g/40gmol^{-1}$

Molarity = $(4x1000)/(40 \times 1000) = 0.1\ molL^{-1}$

Q.22 How is H_2SO_4 manufactured by Contact process ? Write all the steps involved in the preparation. (3)

Ans.

Contact Process which involves three steps :

i) Burning of sulphur or sulphide ores in air to generate SO_2.

$S + O_2 \longrightarrow SO_2$

ii) Conversion of SO_2 to SO_3 by the reaction with oxygen in the presence of a catalyst (V_2O_5), and

$2SO_2(g) + O_2(g) \xrightarrow{V_2O_5} 2SO_3(g)\ \ \Delta_1H^{\ominus} = -196.6\ kJmol^{-1}$

iii) Absorption of SO_3 in H_2SO_4 to give Oleum ($H_2S_2O_7$)

$SO_3 + H_2SO_4 \longrightarrow H_2S_2O_7$

(Oleum)

Dilution of oleum with water gives H_2SO_4 of the desired concentration

$H_2S_2O_7 + H_2O \longrightarrow H_2SO_4$

OR

i) Why ICI is more reactive than I_2 ?

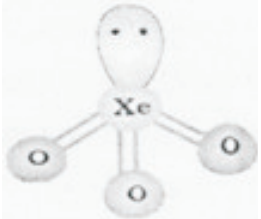
ii) Draw the structure of *XeO_3*.

iii) Oxygen exhibits only – 2 oxidation state in most of its compounds while other members of this family show + 4 and + 6 oxidation state as well. Explain why is it so ? (1+1+1)

Ans.

i) Inter halogen bond is weaker because of its partly ionic character due to difference in electronegativities. When same halogens form X_2 type molecules (like I_2) then they form covalent bonds which are stronger than interhalogen compound. A weaker bond is more reactive than the stronger bond and that's why ICI is more reactive than I_2

ii)



(Pyramidal)

iii) Oxygen cannot expand its octet or covalency beyond two due to absence of empty d orbitals while other members of this family can do so.

Q.23 a) Write a short note on Finkelstein reaction.

b) Why is the solubility of haloalkanes in water very low?

c) How will you convert iso-propyl bromide to n-propyl bromide. (1+1+1)

Ans. (a) Alkyl iodides are prepared by the reaction of alkyl chlorides/bromides with NaI in dry acetone. This is called Finkelstein reaction.

$R–X + NaI \longrightarrow R–I + NaX$; (X = Cl, Br).

(b) When haloalkanes to dissolve in water, energy is required to overcome the attraction between the haloalkanes molecules and break the hydrogen bonds between water molecules. Less energy is released when new attraction is set up between the haloalkanes and the water molecules, as these are as strong as the original hydrogen bonds in water.

(c) $CH_3-\underset{\underset{Br}{|}}{CH}-CH_3 + KOH_{(alc)} \longrightarrow CH_3–CH=CH_2 + HBr \xrightarrow{Peroxide} CH_3–CH_2–CH_2–Br$

Q.24 a) Explain why p-nitrophenol is more acidic than phenol.

b) $C_6H_5OH + Zn \rightarrow$ _____ + _____. (Predict the products)

c) How will you distinguish between phenol and ethanol ? (1+1+1)

Ans. a) The nitro-group is an electron-withdrawing group. The presence of this group in the ortho or para position decreases the electron density in the O-H bond. As a result, it is easier to lose a proton. Also, the p-nitrophenoxide ion formed after the loss of protons is stabilized by resonance. Hence, p-nitrophenol is stronger acid than phenol.

b) $\underset{\text{Phenol}}{C_6H_5OH} + Zn \rightarrow \underset{\text{(Benzene)}}{C_6H_6} + ZnO$

c) Phenol reacts with $FeCl_3$ to form a violet coloured complex, alcohol doesn't. Phenol turns blue litmus red, while alcohol doesn't.

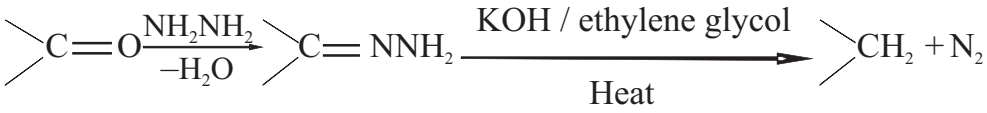
Q.25 a) Write a short note on Wolf-Kishner reduction reaction.

b) Arrange the following in decreasing order of their acidic strength.

CH_3CH_2OH, $ClCH_2COOH$, FCH_2COOH, CH_3COOH

c) How will you convert Benzoic acid to Benzaldehyde ? (1+1+1)

Ans. (a) The reaction of aldehyde or ketone with hydrazine followed by heating with sodium or potassium hydroxide in high boiling solvent such as ethylene glycol to give corresponding alkane is called Wolff-Kishner reduction.



(Wolff-Kishner reduction)

(b) $CH_3CH_2OH < CH_3COOH < C1CH_2COOH < FCH_2COOH$

(c) $C_6H_5COOH + SOC1_2 \xrightarrow[-HCl]{-SO_2} C_6H_5COC1 + H_2 \xrightarrow[S]{Pd/BaSO_4} C_6H_5CHO$

OR

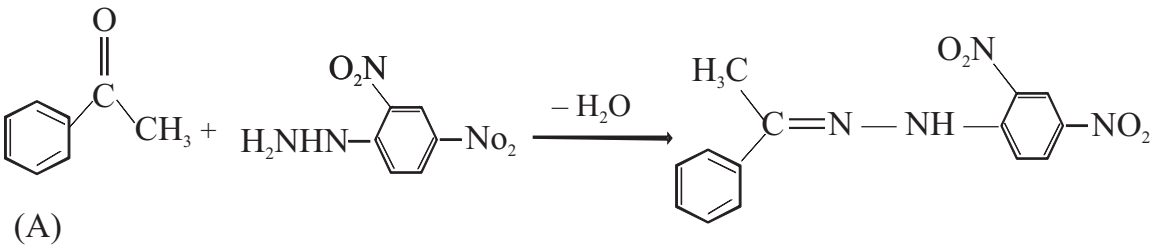
An organic compound (A) with molecular formula C_8H_8O forms an orangered precipitate with 2,4-DNP reagent and gives yellow precipitate on heating with iodine in the presence of sodium hydroxide. It neither reduces Tollens' or Fehlings' reagent, nor does it decolourise bromine water or Baeyer's reagent. On drastic oxidation with chromic acid, it gives a carboxylic acid (B) having molecular formula $C_7H_6O_2$. Identify the compounds (A) and (B) and explain the reactions involved. (3)

Ans. (A) forms 2, 4-DNP derivative. Therefore it is an aldehyde or a ketone. Since it does not reduce Tollens' or Fehling reagent, (A) must be a ketone.

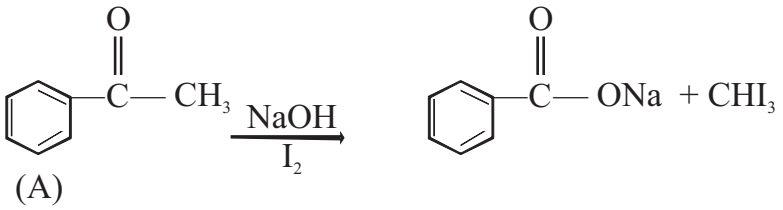
(A) responds to iodoform test. Therefore, it should be a methyl ketone. The molecular formula of (A) indicates high degree of unsaturation, yet it does not decolourise bromine water or Baeyer's reagent. This indicates the presence of unsaturation due to an aromatic ring.

Compound (B), being an oxidation product of a ketone should be a carboxylic acid.The molecular formula of (B) indicates that it should be benzoic acid and compound (A) should, therefore, be a monosubstituted aromatic methyl ketone. The molecular formula of (A) indicates that it should be phenyl methyl ketone (acetophenone).

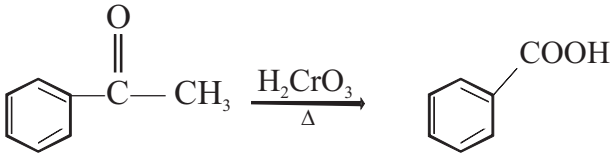
Reactions are as :



(A) C_8H_8O 2, 4-Dinitrophenylhydrazine 2, 4-DNP derivative



(A)



(A) (B)

$C_7H_6O_2$

Q.26 (a) Discuss the working of lead storage cell giving reactions that are taking place during discharging operation.

(b) What do you mean by E.M.F. of a cell ? Calculate the E.M.F. of the cell :

$Mg(s) \mid Mg^{2+}(0.2M) \parallel Ag^{+}(0.001\ M) \mid Ag(s)$. Given that :

$E^0_{(Ag^+/Ag)} = +0.80V,\ E^0_{(Mg^{2+}/Mg)} = -2.37V$

(c) State Faraday's first law of electrolysis. (2+2+1)

(a) Lead storage battery commonly used in automobiles and invertors. It consists of a lead anode and a grid of lead packed with lead dioxide (PbO_2) as cathode. A 38% solution of sulphuric acid is used as an electrolyte.

The cell reactions when the battery is in use are given as :

At anode : $Pb(s) + SO_4^{2-}(aq) \longrightarrow PbSO_4(s) + 2e^-$

At cathode : $PbO_2(s) + So_4^{2-}(aq) + 4H^+(aq) + 2e^- \longrightarrow PbSO_4(s) + 2H_2O\,(l)$

i.e. overall cell reaction consisting of cathode and anode reactions is :

$Pb(s) + PbO_2(s) + 2H_2SO_4(aq) \longrightarrow 2PbSO_4(s) + 2H_2O(l)$

(b) The e.m.f. is the difference between the electrode potentials (reduction potentials) of the cathode and anode. It is called the cell electromotive force (emf) of the cell when no current is drawn through the cell.

We know that according to Nernst equation,

$$E_{(cell)} = E^0_{(cell)} - \frac{RT}{2F} \ln \frac{[Mg^{2+}]}{[Ag^+]^2}$$

$$E^0_{cell} = E^0_{cathode} - E^0_{anode} = 0.80 - (-2.37) - 3.17\ V$$

For cell reaction

$$Mg + 2Ag^{+} \longrightarrow 2Ag + Mg^{2+}$$

$$E_{cell} = E^{0}_{cell} - \frac{0.0591}{n} \log \frac{[Mg^{2+}]}{[Ag^{+}]^{2}}$$

$$= 3.17 - \frac{0.0591}{2} \log \frac{0.2}{(0.001)^{2}}$$

$$= 3.17 - 0.15$$

$$= 3.02\ V$$

(c) The amount of chemical reaction which occurs at any electrode during electrolysis by a current is proportional to the quantity of electricity passed through the electrolyte (Solution or melt).

Q.27 (a) What happens when :

I) $K_2Cr_2O_7$ reacts with an acidified solution of $FeSO_4$?

ii) $KMnO_4$ reacts with an acidified solution of Kl ?

(b) Explain the following :

i) The second and third rows of transition elements resemble each other much more than they resemble the first row. Explain why?

ii) Why first ionisation enthalpy of Cr is lower than that of Zn ?

iii) Why transition metals ions show magnetic properties ? (2+3)

Ans. a) I) $K_2Cr_2O_7 + 6FeSO_4 + 7H_2SO_4 \rightarrow 3Fe_2(SO_4)_3 + K_2SO_4 + Cr_2(SO_4)_3 + 7H_2O$

ii) $2KMnO_4 + 10KI + 8H_2SO_4 \rightarrow 5I_2 + 6K_2SO_4 + 2MnSO_4 + 8H_2O$

b) i) Due to lanthanoid contraction the atomic and ionic radii of second and third rows of transition elements are similar, hence they resemble each other.

ii) The first ionisation enthalpy of Cr is lower because there is no change in the d configuration whereas for Zn the value of the first ionisation enthalpy is higher because electron is removed from stable 4s orbital.

iii) It is because of presence of unpaired electrons in 3d and 4s sub-levels of transition elements.

Q.28 a) Compare the relative basic strength of primary, secondary and tertiary amines in aqueous solutions.

b) Differentiate between DNA and RNA.

c) What is meant by zwitter ion ? (2+2+1)

Ans. i) When amines are dissolved in water, they form protonated amines. The more the hydration energy of the molecule, more is the stability of the amine. The number of hydrogen bonds possible when primary amines are dissolved in water is the greatest, which shows that they are most stable species of amine. The tertiary amines form least hydrogen bonds but have greatest +I effect and steric hindrance. The combined effect of +I effect and steric hindrance and the solvation of amines causes the basicity order to be :

NH_3 < primary amine ~ tertiary amine < secondary amine

(ii)

DNA	**RNA**
It contains the deoxyribose sugar	It contains the ribose sugar.
It contains thymine base.	It contains uracil base instead of thymine
It has a double stranded helix structure	It has single stranded helix structure
It can replicate itself.	It cannot replicate.

iii) A molecule having both acidic as well as basic groups is called a zwitter ion.

For example ; amino acids in aqueous solution.