

-
- Q.1 Volume occupied by atoms in bcc is [1]
 (a) 52.4% (b) 74% (c) 68% (d) None
- Ans. (c) 68%
- Q.2 The electrode Potential of SHE fixed as [1]
 (a) 0.34 V (b) -0.44 V (c) 0 V (d) -0.76 V
- Ans. (c) 0 V
- Q.3 Tyndall effect is observed in [1]
 (a) True solution (b) Precipitate (c) Colloidal solution (d) Vapour
- Ans. (c) Colloidal solution
- Q.4 Purest form of iron is [1]
 (a) cast iron (b) wrought iron (c) steel (d) pig iron
- Ans. (b) wrought iron
- Q.5 Which is colourless in H_2O [1]
 (a) Ti^{+3} (b) V^{+3} (c) Cr^{+3} (d) Sc^{+3}
- Ans. (d) Sc^{+3}
- Q.6 Which of the following is used as artificial sweetener [1]
 (a) Saccharin (b) Aspirin (c) Omeprazole (d) Pheniramine
- Ans. (a) Saccharin
- Q.7 What is calcinations? [1]
- Ans. **Calcination:** The process of converting carbonates and hydroxide ores of metals of their respective oxides by heating them strongly below their melting points either in absence or limited supply of air is called calcinations. For example.
- $$\underset{\text{Limonite}}{Fe_2O_3 \cdot 3H_2O} \xrightarrow{\Delta} Fe_2O_3 + 3H_2O$$
- $$\underset{\text{Calamine}}{ZnCO_3} \xrightarrow{\Delta} ZnO + CO_2$$
- Q.8 Give units of rate constant for First Order Reaction. [1]
- Ans. S^{-1} .
- Q.9 Name the metal present in Vitamin- B_{12} . [1]
-

Ans. Co.

Q.10 Define ligand. [1]

Ans. **Ligand:** The molecules or ions attached to the central metal atom or ion are called ligand e.g., in complex $[Ni(NH_3)_6]^{2+}$, NH_3 molecules are 'ligands'.

Q.11 Differentiate between Chemisorption and Physisorption. [2]

Ans. **Differentiate between Chemisorption and Physisorption**

Sr. No	Physisorption	Chemisorption
1.	Forces of attraction between adsorption and adsorbate are weak van der Waal's forces.	Forces between adsorbent and adsorbate are chemical forces.
2.	It is non-specific in nature.	It is specific in nature
3.	It is temporary and reversible.	It is permanent and irreversible.
4.	In this multimolecular layer is formed.	In this unimolecular layer is formed.

Q.12 Prove that relative lowering in the vapour pressure is a colligative property. [2]

Ans. When a non-volatile solute is added to a solvent, its vapour pressure is lowered, i.e., the vapour pressure of the solution is always less than the vapour pressure of the solvent at the same temperature.

x_A = mole fraction of solvent

x_B = mole fraction of solute

p^0 be the vapour pressure of the pure solvent.

p be the vapour pressure of the solution at a given temperature, then

$p^0 - p$ = Lowering in vapour pressure = Δp

$\frac{p^0 - p}{p^0}$ = Relative lowering in vapour pressure = $\frac{\Delta p}{p^0}$

According to Raoult's law,

$p = p^0 x_A$

$\therefore \Delta p = p^0 - p$

$\Delta p = p^0 - p^0 x_A$

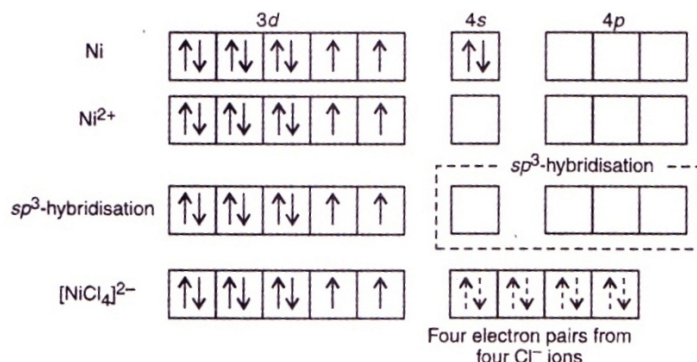
$\Delta p = p^0 (1 - x_A)$

Or $\frac{\Delta p}{p^0} = (1 - x_A) = x_B$ = mole fraction of the solute

According to above statement, the relative lowering in vapour pressure depends upon the molar concentration of the solute and is independent of the nature of the solute. Therefore, relative lowering in vapour pressure is a colligative property.

Q.13 Discuss the Magnetic behavior, Nature, geometry of $[NiCl_4]^{2-}$ ion on the basis of VBT. [2]

Ans. **$[NiCl_4]^{2-}$ complex:** The electronic configuration of nickel is $[Ar]3d^8 4s^2$. The oxidation state of nickel in this complex is +2, i.e., Ni^{2+} is formed by loss of two electrons from 4s-subshell. Ni^{2+} is a d^8 ion. Due to the presence of weak ligands (Cl^-) in $[NiCl_4]^{2-}$, the two unpaired electrons in nickel ion (Ni^{2+}) do not pair up. Here Ni^{2+} ion undergoes sp^3 -hybridisation to accommodate the four pairs of electrons from four chloride ions (Cl^-). As the complex contains two unpaired electrons, it is paramagnetic. The shape of the complex is tetrahedral due to the sp^3 hybridisation of Ni^{2+} ion.



Q.14 Explain: [2]

(i) Radius Ration (ii) Unit Cell.

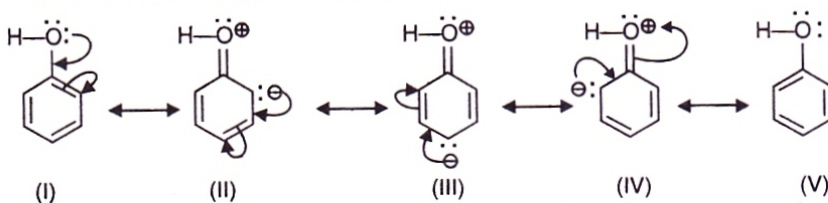
Ans. **(i) Radius Ration:** The ratio of the radii of the cation and radii of the anion is termed as radius ratio.

$$\text{Radius Ration} = \frac{\text{Radius of the positive ion (cation)}}{\text{Radius of the negative ion (anion)}} = \frac{r_c^+}{r_a^-}$$

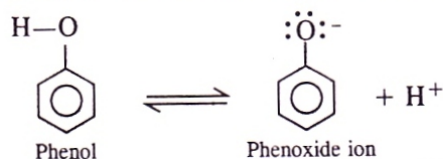
(ii) Unit Cell: The smallest position of crystal lattice which when repeated in different directions generates the entire lattice.

Q.15 Phenols are more acidic than alcohols. Explain. [2]

Ans. Out of alcohols and phenols, phenols are more acidic.

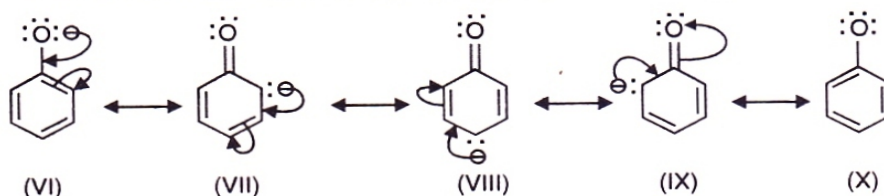


Phenol is a resonance hybrid of the following contributing structures.



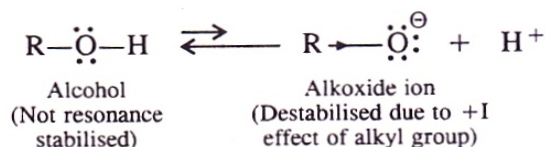
Due to resonance, oxygen acquires some positive charge (II to IV). It will strongly attract the shared electrons of O—H bond towards itself and H^+ ion is released.

Phenoxide ion is also resonance stabilised.



Phenoxide ion is stabilised to a greater extent due to the dispersion of $-ve$ charge. Thus, phenoxide ion is readily formed due to the dissociation of phenol.

On the other hand, neither alcohol nor alkoxide ion is resonance stabilised. Moreover, alkyl group due to its $+I$ effect increases the electron density on oxygen in alkoxide ion and thus, destabilises it.



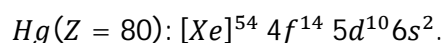
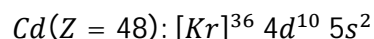
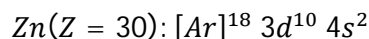
Thus, alcohols do not dissociate to give H^+ ion. Hence phenols are more acidic than alcohols.

Q.16 (a) Zn, Cd, Hg are soft. Why?

[1+1]

(b) d-block element form complexes. Why?

Ans. (a) Zn, Cd and Hg belong to Group 12 of long form of the periodic table with general electronic configuration of $(n-1)d^{10}ns^2$. This is due to fully d-subshell in penultimate shell and as such $d-d$ overlappings are not possible. Hence, Zn, Cd, Hg are soft.



(b) d-block metals form a large number of complexes due to the following reasons:

(i) The presence of vacant $(n-1)$ d-orbitals, which can accept one or more electron pairs from ligands.

(ii) High charge density on d-block metal cations.

Q.17 Explain:

[2]

(i) Aldol condensation

(ii) Coupling Reaction.

It is a chemical reaction in which two molecules of same or different aldehydes or ketones containing α -hydrogen atom unite together in presence of a dilute base (dil. NaOH, Ba(OH)₂, K₂CO₃ etc) undergo condensation to form β -hydroxy aldehydes or β -hydroxy ketones. This reaction is called **aldol condensation**. For example,

$$\begin{array}{c}
 \text{O} \quad \quad \quad \text{O} \\
 \parallel \quad \quad \quad \parallel \\
 \text{CH}_3-\text{C}-\text{H} + \text{H}-\overset{\alpha}{\text{CH}_2}-\text{C}-\text{H} \xrightarrow{10\% \text{ aq. NaOH}} \text{CH}_3-\overset{\text{OH}}{\text{CH}}-\text{CH}_2-\overset{\text{O}}{\parallel}{\text{C}}-\text{H} \\
 \text{Ethanal (Acetaldehyde)} \quad \quad \quad \text{3-Hydroxybutanal (Aldol)} \\
 2 \text{ molecules}
 \end{array}$$

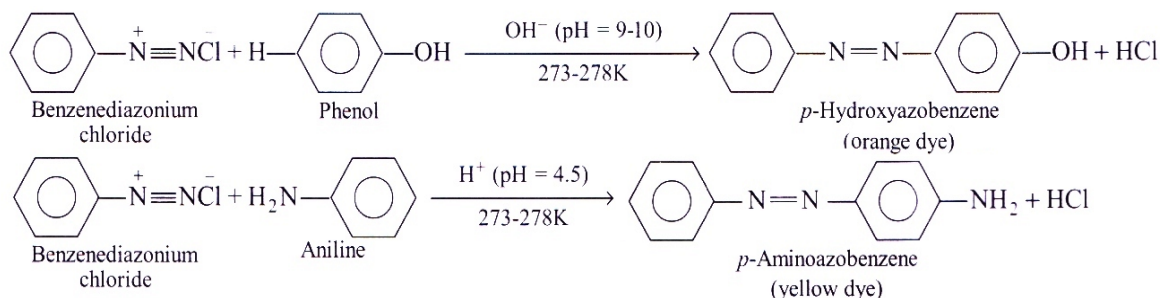
$$\begin{array}{c}
 \text{O} \quad \quad \quad \text{CH}_3 \quad \quad \quad \text{O} \\
 \parallel \quad \quad \quad | \quad \quad \quad \parallel \\
 \text{CH}_3-\text{CH}_2-\text{C}-\text{H} + \text{H}-\overset{\alpha}{\text{CH}}-\text{C}-\text{H} \xrightarrow{10\% \text{ aq. NaOH}} \text{CH}_3-\text{CH}_2-\overset{\text{OH}}{\text{CH}}-\overset{\text{CH}_3}{\text{CH}}-\overset{\text{O}}{\parallel}{\text{C}}-\text{H} \\
 \text{Propanal (Propionaldehyde)} \quad \quad \quad \text{3-Hydroxy-2-methylpentanal} \\
 2 \text{ molecules} \quad \quad \quad (\beta\text{-Hydroxy-}\alpha\text{-methylvaleraldehyde})
 \end{array}$$

$$\begin{array}{c}
 \text{O} \quad \quad \quad \text{O} \\
 \parallel \quad \quad \quad \parallel \\
 \text{CH}_3-\text{C} + \text{H}-\overset{\alpha}{\text{CH}_2}-\text{C}-\text{CH}_3 \xrightarrow{10\% \text{ aq. NaOH}} \text{CH}_3-\overset{\text{OH}}{\underset{\text{CH}_3}{\text{C}}}-\text{CH}_2-\overset{\text{O}}{\parallel}{\text{C}}-\text{CH}_3 \\
 \text{Propanone (Acetone)} \quad \quad \quad \text{4-Hydroxy-4-methylpentan-2-one} \\
 2 \text{ molecules} \quad \quad \quad \text{(Diacetone alcohol)}
 \end{array}$$

$$\begin{array}{ccc}
 \begin{array}{c} \text{OH} \\ | \\ \text{CH}_3 - \text{CH} - \text{CH}_2 - \text{C}(=\text{O}) - \text{H} \\ \text{3-Hydroxybutanal} \end{array} & \xrightarrow[\text{(-H}_2\text{O)}]{\text{dil. HCl, heat}} & \begin{array}{c} \beta \quad \alpha \\ \text{CH}_3 - \text{CH} = \text{CH} - \text{C}(=\text{O}) - \text{H} \\ \text{But-2-en-1-al} \\ \text{(Crotonaldehyde)} \end{array} \\
 \\
 \begin{array}{c} \text{OH} \quad \text{CH}_3 \quad \text{O} \\ | \quad | \quad || \\ \text{CH}_3 - \text{CH}_2 - \text{CH} - \text{CH} - \text{C} - \text{H} \\ \text{3-Hydroxy-2-methylpentanal} \end{array} & \xrightarrow[\text{(-H}_2\text{O)}]{\text{dil. HCl, heat}} & \begin{array}{c} \text{CH}_3 \quad \text{O} \\ | \quad || \\ \text{CH}_3 - \text{CH}_2 - \text{CH} = \text{C} - \text{C} - \text{H} \\ \text{2-Methylpent-2-en-1-al} \end{array} \\
 \\
 \begin{array}{c} \text{OH} \quad \text{O} \\ | \quad || \\ \text{CH}_3 - \text{C} - \text{CH}_2 - \text{C} - \text{CH}_3 \\ | \\ \text{CH}_3 \\ \text{4-Hydroxy-4-methylpentan-2-one} \end{array} & \xrightarrow[\text{(-H}_2\text{O)}]{\text{dil. HCl, heat}} & \begin{array}{c} \text{O} \\ || \\ \text{CH}_3 - \text{C} = \text{CH} - \text{C} - \text{CH}_3 \\ | \\ \text{CH}_3 \\ \text{4-Methylpent-3-en-2-one} \\ \text{(Mesityl oxide)} \end{array}
 \end{array}$$

Under suitable conditions, arene diazonium salts react with certain aromatic compounds like phenols and amines to form **azo compounds** of the general formula, $\text{Ar}-\text{N}=\text{N}-\text{Ar}$ (containing the $-\text{N}=\text{N}$ azo linkage) is called **coupling reaction**. The coupling with phenols takes place in mildly alkaline medium while with amines it occurs under faintly acidic conditions.

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Q.18 (a) A solution 25% H_2O , 25% ethanol and 50% Acetic Acid by mass. Calculate the mole fraction of ethanol and Acetic Acid in the solution. [2+1]

(b) Define Antibiotics.

Or

(a) Out of 1 M urea and 1 M KCl solution which has higher freezing point?

(b) Define Antifertility drugs.

Ans. (a)

Substance	Mass	Molecular mass	Number of moles
Water (H_2O)	25 g	18	$n_1 = \frac{25}{18} = 1.38$
Ethanol ($\text{C}_2\text{H}_5\text{OH}$)	25g	46	$n_2 = \frac{25}{46} = 0.543$
Acetic acid (CH_3COOH)	50g	60	$n_3 = \frac{50}{60} = 0.833$

Mole fraction of water:

$$x_1 = \frac{n_1}{n_1 + n_2 + n_3} = \frac{1.38}{1.38 + 0.543 + 0.833} = 0.5$$

Mole fraction of ethyl alcohol:

$$x_2 = \frac{n_2}{n_1 + n_2 + n_3} = \frac{0.543}{1.38 + 0.543 + 0.833} = 0.197$$

Mole fraction of acetic acid:

$$x_3 = \frac{n_3}{n_1 + n_2 + n_3} = \frac{0.833}{1.38 + 0.543 + 0.833} = 0.302$$

(b) Antibiotics: Chemical substances which are produced by micro-organisms (Such as bacteria, fungi and moulds) and can be used to kill other micro-organisms are called antibiotics.

Example: Penicillin.

Or

(a) ΔT_f = depression in freezing point.

T_f^0 = freezing point of the pure solvent

T_f = freezing point of the solution.

We know,

$$\Delta T_f = K_f \times m$$

i.e., more no of ions more is depression freezing point.

$$\text{Also } \Delta T_f = T_f - T_f^0$$

So, KCl has more depression is freezing point and hence urea shows more freezing point.

(b) Antifertility drugs: Chemical substances used to check pregnancy in women are called anti-fertility frigs or birth control drugs or oral contraceptives.

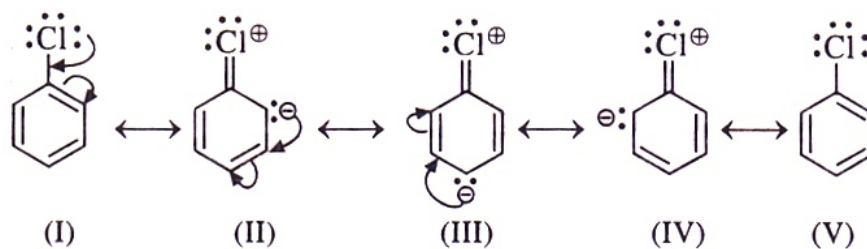
Example: Norethindrone, Ethynylestradiol (Novestrol), Mifepristone.

Q.19 (a) Why Haloarenes are less reactive than Haloalkanes?

[2+1]

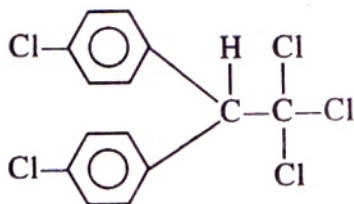
(b) Give IUPAC name of D.D.T.

Ans. (a) Haloarenes are resonance syabilised. For eample, chlorobenzene is a resonance hybrid off various contributing structures (I) to (V) as shown below:



As a result of resonance, in structure (II) (IV), C-Cl bond acquires some double bond character. On the other hand, no such resonance occurs in alkyl halides. Therefore, C-Cl bond in aryl halides is stronger than carbon-halogen bond in haloalkances and hence can not be easily broken, so chlorobenzene is less reactive.

(b) IUPAC name of D.D.T:



[2,2-bis(4-chlorophenyl)-1, 1, 1-trichloroethane]

Q.20 (a) Derive Integrate Rate law equation for First Order Reaction.

[2+1]

(b) What are the units of Rate Constant for 3rd Order Reaction?

Ans. (a) A reaction is said to be of first order if its rate is determinate by the change of one concentration term only.

Consider the reaction



Let a be the concentration of A at the start and after time t , the concentration becomes $(a - x)$, i.e., x has been changed into products. The rate of reaction after time ' t ' is given by the expression

$$\frac{dx}{dt} = k(a - x)$$

or
$$\frac{dx}{(a - x)} = k dt$$

Upon integration of above equation,

$$\int \frac{dx}{(a - x)} = k \int dt$$

or
$$-\log_e (a - x) = kt + C$$

where C is integration constant.

When $t = 0$, $x = 0$,

$\therefore C = -\log_e a$

Putting the value of ' C ',

$$-\log_e (a - x) = kt - \log_e a$$

or
$$\log_e a - \log_e (a - x) = kt$$

or
$$\log_e \frac{a}{(a - x)} = kt$$

or
$$k = \frac{2.303}{t} \log \frac{a}{(a - x)} \quad \dots (i)$$

The above equation can also be written as

$$k = \frac{2.303}{t} \log \frac{[R_0]}{[R]} \quad \dots (ii)$$

where $[R_0]$ = Initial concentration of reactant

$[R]$ = Remaining concentration of reactant after time ' t '.

From (ii) the exponential form of kinetic equation may be given as

$$[R] = [R_0]e^{-kt} \quad \dots (iii)$$

(b) Units of Rate Constant for 3rd Order Reaction:

$$L^2 mol^{-2} s^{-1} \quad \text{Or} \quad atm^{-2} s^{-1}.$$

Q.21 (a) O_2 is gas but sulphur is solid. Why?

[1+1+1]

(b) PCl_5 is known but NCl_3 does not?

(c) Why does O_3 act as a powerful oxidizing agent?

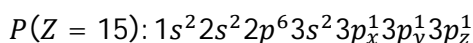
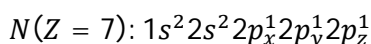
Or

- (a) SF_6 exist but OF_6 does not why?
- (b) Why H_2SO_4 is called king of chemicals?
- (c) Why Ammonia acts as ligand?

Ans. (a) Oxygen forms a stable diatomic molecule. In oxygen molecule, two atoms of oxygen are joined together through double bond ($O=O$). The multiple bonding in the oxygen is possible due to small size of oxygen. Due to smaller molecular mass oxygen is a gas at room temperature.

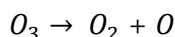
Sulphur is polyatomic molecules because multiple bonding is not possible in these elements due to large atomic size. For example, sulphur has 8 atoms arranged in the form of a puckered ring per molecule. In this structure, each sulphur atom is linked to two other sulphur atoms through single covalent bonds. Consequently, sulphur has high molecular mass. Because of this, sulphur is a solid at room temperature.

- (b) Electronic configuration of nitrogen and phosphorus in ground state is:



Thus, electronic excitation from 3s to 3d-subshell in phosphorus is possible due to the availability of vacant 3d-orbitals in the valance shell. This give rise to five half filled orbitals, which can hybridise to give five equivalent sp^3d –hybrid orbitals resulting in the formation of pentahalides like PF_5 . Such excitations are not possible in nitrogen because d-orbitals are not present in the valance shell of nitrogen.

- (c) O_3 act as a powerful oxidizing agent because it can liberate nascent oxygen, it acts as a powerful oxidizing agent. The potential equation is:



Or

- (a) SF_6 exist because sulphur an show an oxidation state of +6 as it can eaily expand its octet. On the other hand OF_6 does not exist because oxygen cannot show an oxidation state of +6. It is due to its inability to expand its octet.
- (b) H_2SO_4 is called king of chemicals because it is practically in every important industry.
- (c) Ammonia acts as ligand because in ammonia, nitrogen has a lone pair of electrons which is available for donation.

Q.22 (a) Explain electrochemical series.

[1+2]

- (b) Can we store 1 M $CuSO_4$ in Zn vessel or not why ?

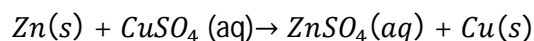
Or

(a) Explain the working of fuel cell.

(b) Define Faradays Second law.

Ans. (a) By measuring the potential of various electrodes versus a standard hydrogen electrode (SHE), a series standard electrode potentials has been established. When the electrodes (metals and non-metals) in contact with their ions are arranged on the basis of the values of their standard reduction potentials or standard oxidation potentials, the resulting series is called the electrochemical series.

(b) Zinc is more reactive than copper. Hence, it displaces copper from copper sulphate solution as follows:

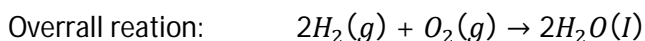
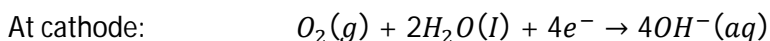
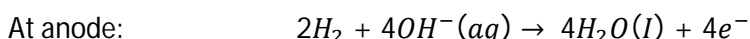


Thus, zinc reacts with CuSO_4 solution. Hence, we cannot store copper sulphate solution in a zinc pot.

Or

(a) Fuel Cell: A fuel cell is a device used to convert chemical energy present in a fuel, directly into electrical energy.

Construction and Working: The figure shows the working of a $\text{H}_2 - \text{O}_2$ fuel cell. It consists of porous carbon electrodes. Suitable catalysts are added to these porous carbon electrodes to accelerate the electrode reactions, as reaction between hydrogen and oxygen at the operating temperature (400 K) of the cell is not very fast. These catalysts are mixed in and pressed with the carbon. At anode, suitable catalysts are finely divided platinum or palladium, at cathode cobaltous oxide (CoO), platinum or silver. Concentrated KOH or NaOH solution placed between electrodes acts as an electrolyte. Hydrogen and oxygen are bubbled through the porous electrodes, at high pressure into the electrolyte. The following electrode reactions take place.



The gases being consumed are continuously supplied.

The construction of fuel cell is, however, faced with certain difficulties. A few of these are as follows.

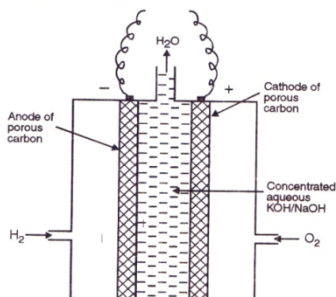
(i) Providing contact between gaseous fuel, liquid electrolyte and solid electrode.

(ii) High cost of the catalyst used in the electrodes (e.g., Pt, Pd, Ag, etc.)

(iii) Problem of handling gaseous fuels at low temperature and high pressures.

Advantages over other cells:

- (i) Pollution free working
- (ii) high efficiency
- (iii) compactness
- (iv) light in weight
- (v) higher reliability



(no moving parts as in generators). Thus they are extremely suitable for certain applications like long manned space flights.

(b) When the same quantity of charge is passed through different electrolytes, then the masses of different substances deposited at the respective electrodes will be the ratio of their equivalent masses.

If Z_1 and Z_2 are the electrochemical equivalents of two substances A and B and E_1 and E_2 are the gram equivalent masses of substances A and B respectively then,

$$Z_1 = \frac{E_1}{96500} \text{ and } Z_2 = \frac{E_2}{96500}$$

i. e., $\frac{Z_1}{Z_2} = \frac{E_1}{E_2}$

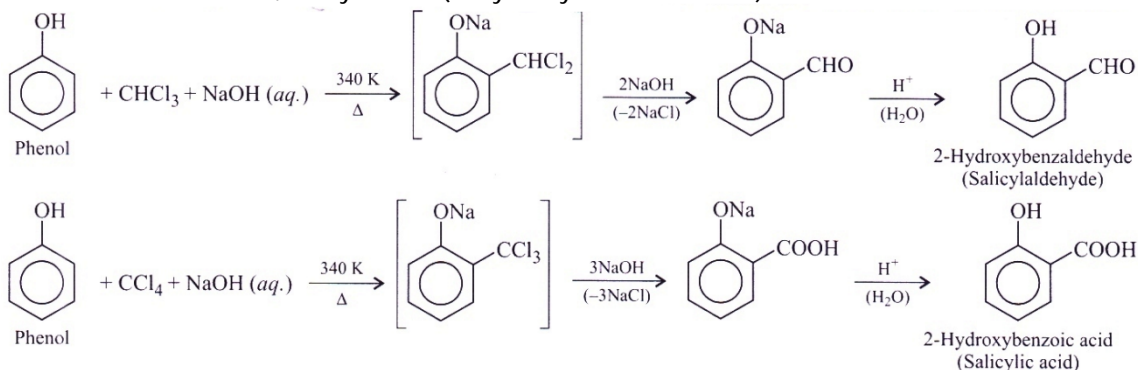
Q.23 (i) Explain:- Reimer-Tiemann Reaction.

[[1+1+1]]

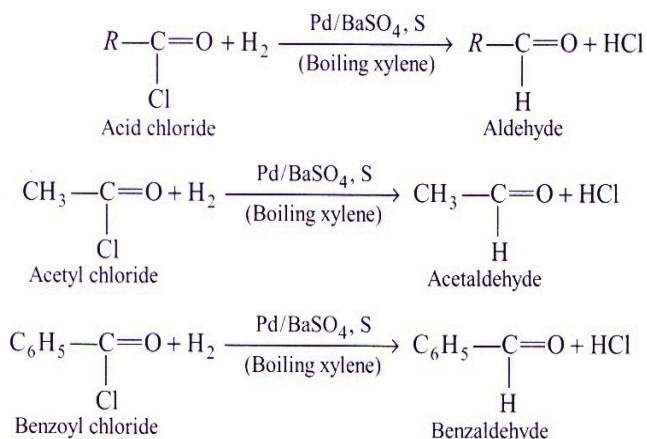
(ii) Rosenmund Reduction

(iii) Give the structure of $XeOF_2$.

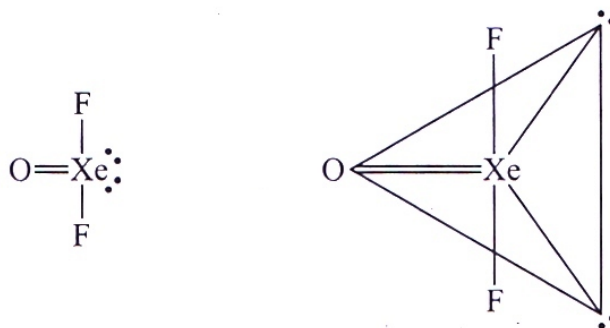
Ans. (i) Phenol, on refluxing with chloroform and sodium hydroxide (aq.) at 340 K followed by acid hydrolysis yields salicylaldehyde (o-hydroxy benzaldehyde). However, when carbon tetrachloride is used, salicylic acid (o-hydroxy benzoic acid)



(ii) Rosenmund Reduction: Acid chlorides can be reduced into aldehydes with hydrogen in boiling xylene using palladium or platinum as a catalyst supported on barium sulphate.



(iii) Structure of $XeOF_2$: $XeOF_2$ has a T-shaped structure. Xenon undergoes sp^3d - hybridization giving trigonal bipyramidal configuration in which two positions are occupied by lone pairs.



Q.24 (a) Define Transition elements. [1+1+1]

(b) Give General electronic configuration of f-block elements.

(c) What are Pseudohalogens?

Ans. (a) Transition elements are those which have partly filled d-orbitals in their elementary form or in their commonly occurring oxidation state. Since Zn, Cd and Hg do not have partly filled d-orbital in their elementary states or most common oxidation states, these are not classified as a transition element.

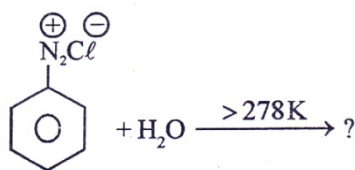
(b) General electronic configuration of f-block elements:

$$(n-2)f^{0-14}(n-1)d^{0-1}ns^2.$$

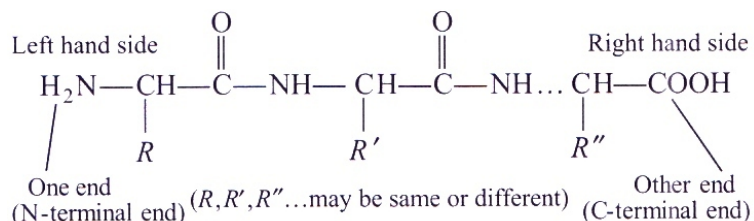
(c) Pseudohalogens: These are those substances which not Halogens but show properties like Halogens.

25. (a) Explain Primary and Secondary structure of Protein.
 (b) Complete the following reaction:

[2+1]



- Ans. (a) The primary structure of a protein refers to the number and sequence of the α –amino acids in its polypeptide chains (discussed in the formation of proteins). The primary structure begins with the amino acid whose amino group is free (the N-terminal end) and it forms the one chain. Free carboxyl group (C-terminal end) forms the other end of the chain.

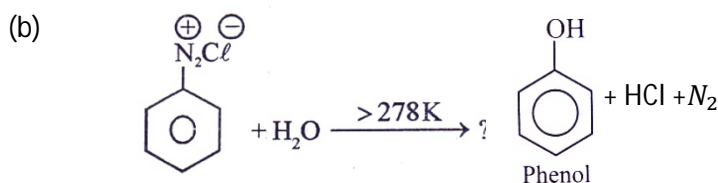


Side chains may have basic groups or acidic groups as $-\text{NH}_2$ in lysine and $-\text{COOH}$ in aspartic acid. Because of these acidic and basic side chains, there are positively and negatively charged centres. Though the peptide linkage is stable, the reactivity is due to these charged centres in the side chains.

The primary structure of a protein is usually determined by its successive hydrolysis with mineral acids or enzymes into various products having decreasing molecular mass as shown below:

Protein \rightarrow Proteoses \rightarrow Peptones

Polypeptides \rightarrow Simple peptides \rightarrow α – Amino acids

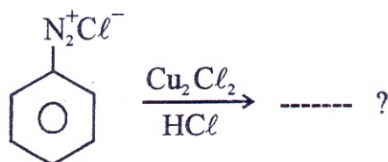


26. (a) Convert Phenol into Salicylic Acid.
 (b) Explain ethylamine is more basic than Ammonia.
 (c) Convert Acetic Acid into Formic Acid.
 (d) What is Carbyl Amine Reaction?

[1+1+1+1]

Or

- (a) Complete the Reaction:

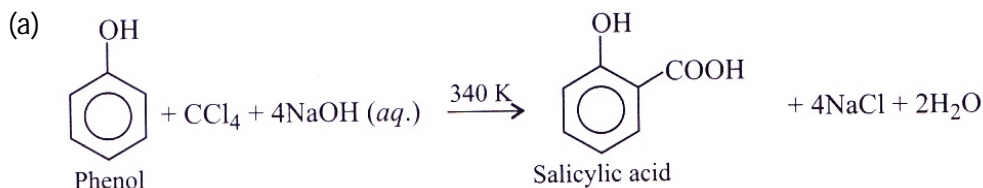


(b) Balz-Schiemann Reaction.

(c) Convert Aniline into Benzoic Acid.

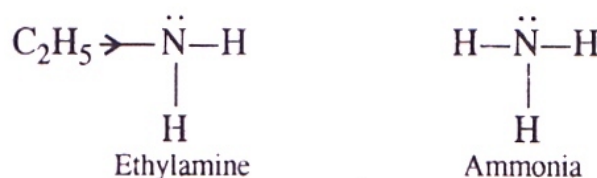
(d) What is Gattermann Reaction?

Ans.

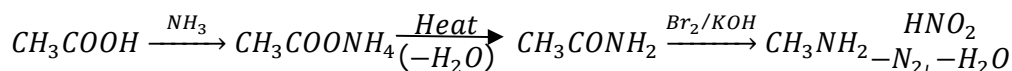


(b) The basic characters of ethylamine and ammonia is due presence of lone pair of electrons on nitrogen.

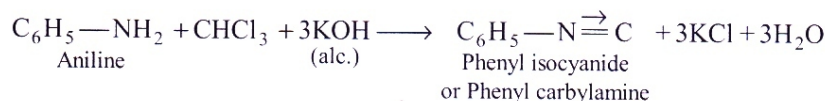
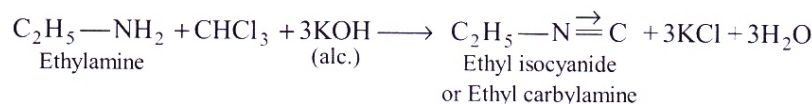
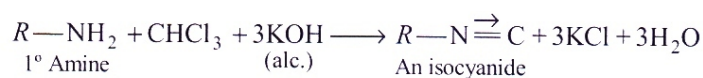
In ethylamine, ethyl group due to its +I effect increases the electron density on nitrogen. Thus protonation takes place more readily in ethylamine than in ammonia.



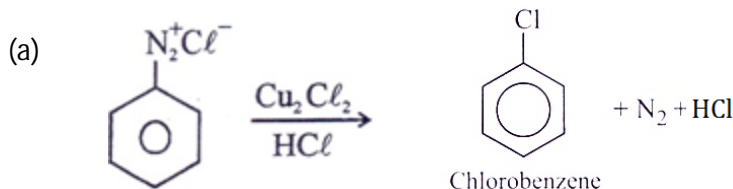
(c) Acetic Acid into Formic Acid:



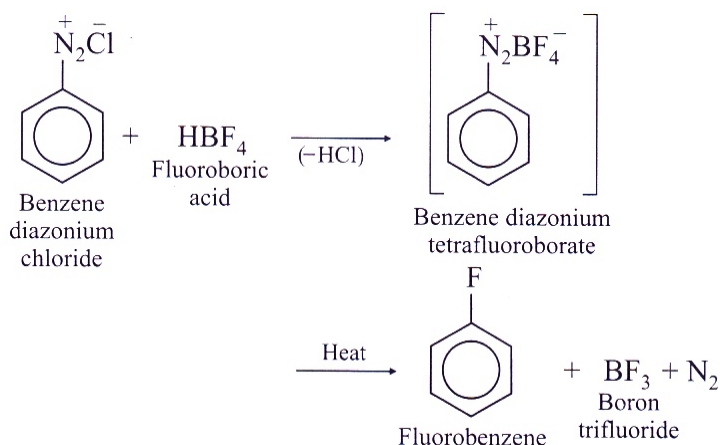
(d) Both aliphatic and aromatic primary amines when warmed with chloroform and an alcoholic solution of potassium hydroxide produce isocyanides or carbylamines having offensive smell is formed.



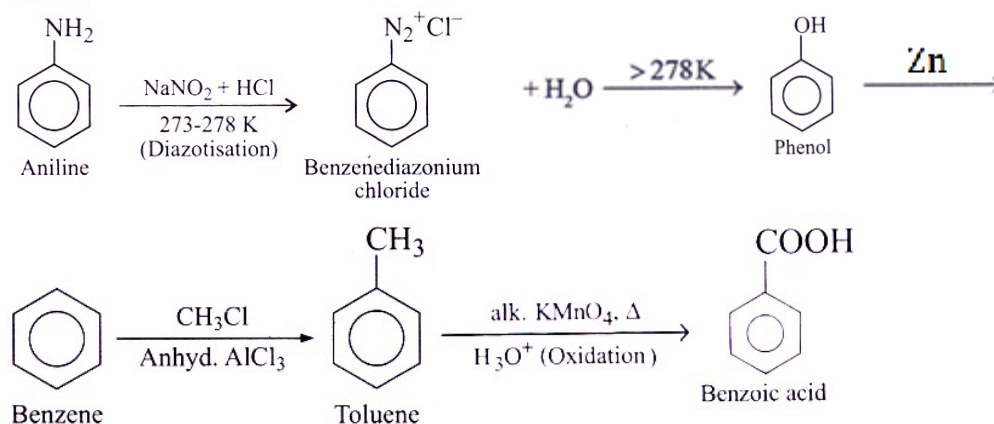
Or



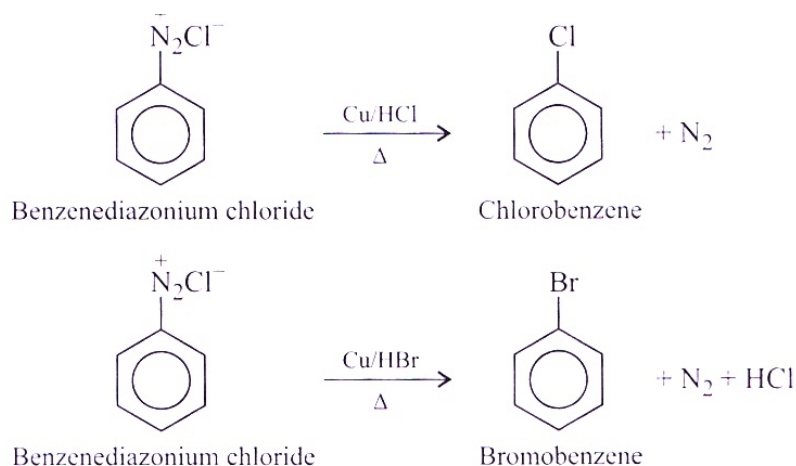
(b) Baiz-Schiemann: In this reaction, the aniline (aromatic p- amine) is first diazotised with NaNa_2 in presence of HBF_4 (fluoroboric acid) at 273-278 K to form benzene diazonium tetrafluoroborate. When heated to dryness, it loses boron trifluoride (BF_3) and nitrogen gas to give fluorobenzene.



(c) Aniline into Benzoic Acid:



(d) Gattermann Reaction: It involves the treatment of arenediazonium chloride with copper powder and hydrogen halide to form an aryl halide.



Q.27 (a) Why does iron gain weight as a result of rusting? [1+2+1]

(b) Differentiate between Thermoplastic and Thermosetting Plastics.

(c) What is zwitter ion?

Ans. (a) Iron gain weight as a result of rusting due to the following reasons:

(i) Air and moisture: These are the two main factors which are responsible for rusting of iron.

(ii) Presence of impurities: Impurities, in general, increase the rate of corrosion.

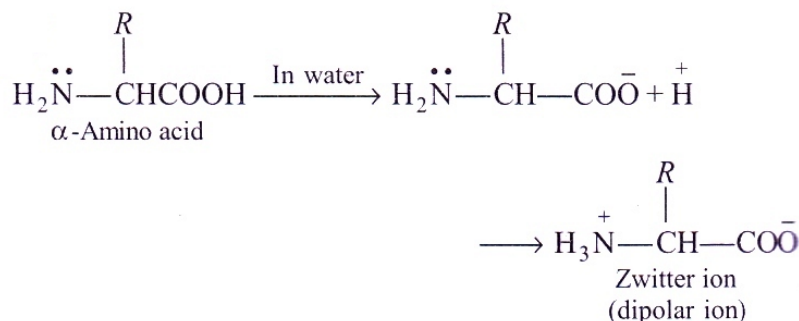
(iii) Presence of electrolyte in water: Rate of corrosion is more in saline water.

(iv) Strain: Strain in metal increases the rate of corrosion.

(b) **Differentiate between Thermoplastic and Thermosetting Plastics**

Sr. No	Thermoplastic Polymer	Thermosetting Plastics
1.	They are linear polymers without cross-linkage and branching (e.g., hydrogen bonding) between polymeric chains can exist.	They have three dimensional network of covalent bonds with cross-linking between chains.
2.	They are fairly strong and less brittle.	They are harder, stronger and more brittle.
3.	These plastics can be recycled i.e., their scrap can be melted and reused. Thus, they are economical.	These plastic cannot be recycled.
4.	These plastic can fill complicated moulds quite easily.	These plastic cannot easily fill intricate moulds.
5.	Examples: P.V.C., Nylon, Polystyrene, Polyethylene, Polypropylene etc.	Example: Phenol-formaldehyde resin, Urea-formaldehyde resin etc.

(c) zwitter ion: The $-NH_2$ group is basic and $-COOH$ group is acidic, in neutral solution, it exists in an internal ionic form called a zwitter ion, where the proton of $-COOH$ group is transferred to the $-NH_2$ group to form inner salt, also known as dipolar ion.



Q:28 (a) Out of S_N^1 and S_N^2 reactions which reaction gives with inversion of configuration? [1+1+1+1]

(b) Which chemical is known as oil of Vitriol?

(c) What is vulcanization of Rubber?

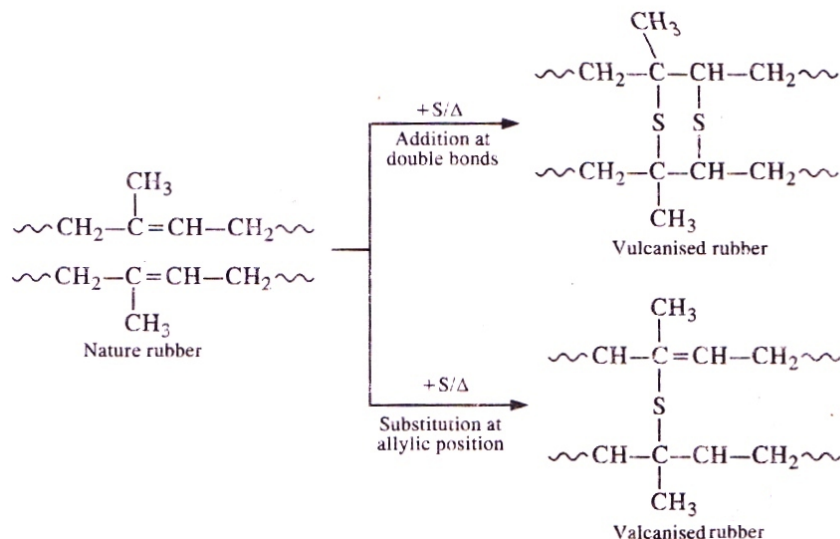
(d) Write esterification Reaction.

Ans. (a) S_N^2

(b) Sulphuric Acid (H_2SO_4).

(c) **Vulcanization of Rubber:**

Vulcanisation involves heating the natural rubber with esulphur and other additives at 375-415 K. On vulcanization sulphur forms cross links at the reactive sites of double bonds (Addition at double bond or substitution at allylic sites) and thus rubber gets stiffened.



(d) **Esterification Reaction:** Carboxylic acids react with alcohols in the presence of an acid catalyst such as dry HCl gas or a few drops of conc. H_2SO_4 to yield esters.

