



Code Number:

**A****Aakash****Medical | IIT-JEE | Foundations**

Corp. Office: Aakash Educational Services Limited, 3rd Floor, Incuspaze Campus- 2, Plot No. 13,  
Sector- 18, Udyog Vihar, Gurugram, Haryana - 122015

Time: 3 hrs.

**Mock Test Paper for Class-XII**

Max. Marks: 70

# CHEMISTRY

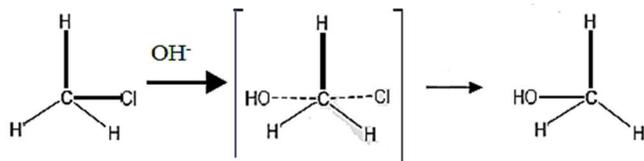
## Answers & Solutions

1. Answer (d)
2. Answer (b)
3. Answer (c)
4. Answer (b)
5. Answer (c)
6. Answer (a)
7. Answer (c)
8. Answer (c)
9. Answer (a)
10. Answer (b)
11. Answer (a)
12. Answer (b)
13. Answer (d)
14. Answer (b)
15. Answer (c)
16. chloroform
17. nucleotide
18. two
19. three
20. hard
21. The mixture of Anhydrous Zinc Chloride with Concentrated Hydrochloric acid (  $\text{Anh. ZnCl}_2 + \text{Conc. HCl}$  ) is called Lucas Reagent. Tertiary alcohols produces turbidity immediately with Lucas Reagent.
22. When methyl chloride is heated with aqueous potassium hydroxide methyl alcohol is formed.  
 $\text{CH}_3 - \text{Cl} + \text{KOH} \rightarrow \text{CH}_3 - \text{OH} + \text{KCl}$

**Mechanism:**

The nucleophile  $\text{OH}^-$  attacks the carbon atom from the side opposite to the chlorine. The formation of C-OH and

the cleavage of C-Cl bond takes place simultaneously. Finally  $\text{Cl}^-$  gets detached to give methyl alcohol.



It involves only one step hence this is the rate determining step.

- Rate depends on both concentration of nucleophile and alkyl halide, hence it is a second order reaction.
- Complete inversion of configuration takes place (Walden Inversion).
- Order of rate of reaction primary  $\text{R-X} >$  secondary  $>$  tertiary

23. According to Arrhenius, this reaction can take place only when a molecule of hydrogen and a molecule of iodine collide to form an unstable intermediate (Activated Complex). It exists for a very short time and then breaks up to form two molecules of hydrogen iodide.

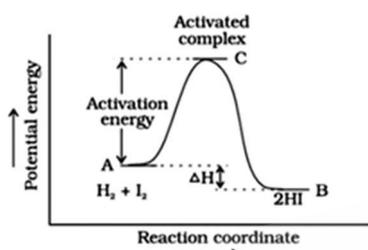


Diagram showing plot of potential energy vs reaction coordinate.

24. Insulin & It which contains 51 amino acids
25. A transition element is defined as the one which has incompletely filled d orbitals in its ground state or in any one of its oxidation states.

**Example:** Fe, Co, Ni & Cu etc.

26. In  $[\text{CoF}_6]^{3-}$  the cobalt ion is in +3 oxidation state. For  $\text{Co}^{3+}$  the electronic configuration is  $[\text{Ar}] 3d^6 4s^0$

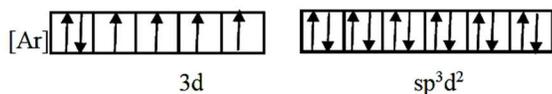


Fluoride is a weak ligand, hence no pairing of electrons takes place in d-orbitals.

Hybridization takes place gives six vacant  $\text{sp}^3\text{d}^2$  hybridized orbitals.

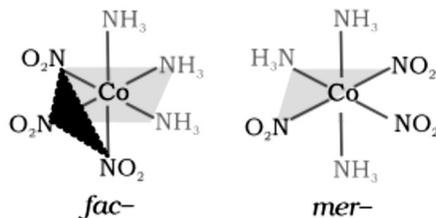


Six pairs of electrons, from six fluoride ligands occupy hybrid orbitals.



Due to presence of unpaired electrons, the complex is **paramagnetic**. It has **octahedral geometry**.

27. Geometrical isomerism occurs in octahedral coordination entities of the type  $[Ma_3b_3]$  like  $[\text{Co}(\text{NH}_3)_3(\text{NO}_2)_3]$ . Denticity of both  $\text{NH}_3$  &  $\text{NO}_2$  are one only.



If three donor atoms of the same ligands occupy adjacent positions at the corners of an octahedral face, we have the facial (fac) isomer. When the positions are around the meridian of the octahedron, we get the meridional (mer) isomer.

28. Steady decrease in the size of lanthanides with increase in atomic number is known as lanthanoid contraction.
- (i) The radii of the members of the third transition series to be very similar to those of the corresponding members of the second series.

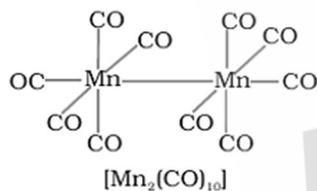
**Ex.** The almost identical radii of Zr and Hf & Nb & Ta

(ii) Difficulty in separation of lanthanoids due to similarity in chemical properties.

29. There are two square pyramidal units present in decacarbonyldimanganese(0).

Molecular Formula:  $\text{Mn}_2(\text{CO})_{10}$

Structural Formula



30. (a)  $4 \text{FeCr}_2\text{O}_4$

(b)  $\boxed{\text{MnO}_4^{2-}}$

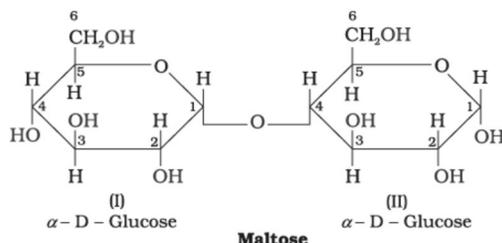
(c)  $\text{MnO}_2$

31. Rate of reaction depends upon the experimental conditions such as concentration of reactants (pressure in case of gases), temperature and catalyst.
32. Concentration term which is commonly used in medicine and pharmacy is mass by volume percentage. It is the mass of solute dissolved in 100 mL of the solution.

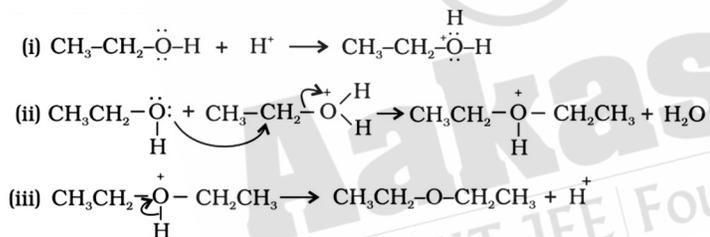
$$\frac{w}{v} \% = \frac{\text{Weight of the solute}}{\text{Volume of the solution}} \times 100$$

33. Materials are classified into conductors, insulators and semiconductors depending on the magnitude of their conductivity.
- Metals and their alloys have very large conductivity and are known as conductors.
  - Substances like glass, ceramics, etc., having very low conductivity are known as insulators.
  - Substances like silicon, doped silicon and gallium arsenide having conductivity between conductors and insulators are called semiconductors and are important electronic materials.

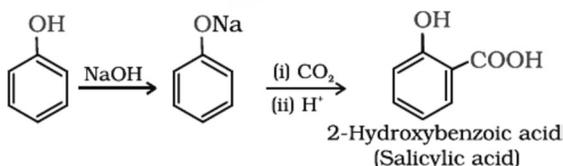
34. (a) Corrosion  
 (b) Atmospheric oxidation :  $2\text{Fe}^{2+}(\text{aq}) + 2\text{H}_2\text{O}(\text{l}) + \frac{1}{2}\text{O}_2(\text{g}) \rightarrow \text{Fe}_2\text{O}_3(\text{s}) + 4\text{H}^+(\text{aq})$   
 (c) One of the simplest methods of preventing corrosion is to prevent the surface of the metallic object to come in contact with atmosphere. This can be done by covering the surface with paint or by some chemicals (e.g. bisphenol).
35. (a) The free aldehyde group can be produced at C1 of second glucose in solution and it shows reducing properties so it is a reducing sugar.



- (b) When the polypeptide chains run parallel and are held together by hydrogen and disulphide bonds, then fibre-like structure is formed. Such proteins are generally insoluble in water and are called Fibrous proteins. The protein present in hair – Keratin
36. (a) The formation of ether is a nucleophilic bimolecular reaction ( $\text{S}_{\text{N}}2$ ) involving the attack of alcohol molecule on a protonated alcohol, as indicated below:



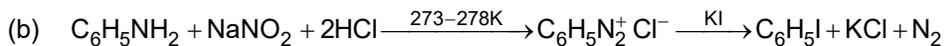
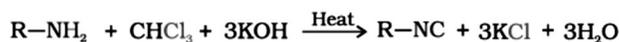
- (b) When phenol is heated with NaOH gives sodium phenate and then  $\text{CO}_2$  is passed through it and followed by acidification gives salicylic acid.



37. (a) (i) Finkelstein's Reaction
- $$\text{R-X} + \text{NaI} \longrightarrow \text{R-I} + \text{NaX}$$
- (ii)  $\text{X}=\text{Cl}, \text{Br}$
- (iii) NaCl or NaBr thus formed is precipitated in dry acetone. Hence it facilitates the forward reaction according to Le Chatelier's Principle.

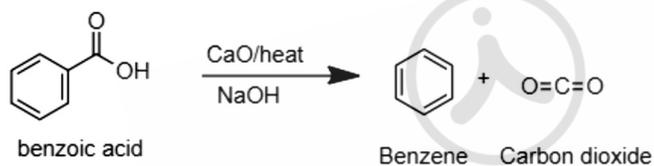
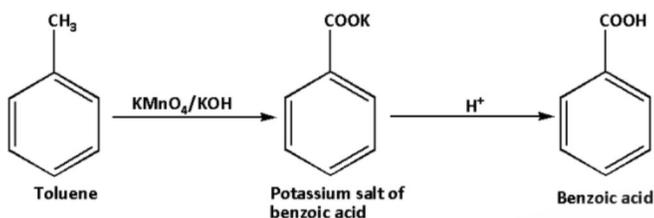
- (b) A mixture containing two enantiomers in equal proportions will have zero optical rotation, as the rotation due to one isomer will be cancelled by the rotation due to the other isomer. Such a mixture is known as racemic mixture or racemic modification.

38. (a) Aliphatic and aromatic primary amines on heating with chloroform and ethanolic potassium hydroxide form isocyanides or carbylamines which are foul smelling substances. This reaction is known as carbylamine reaction or isocyanide test.



39. (a) (i) Rosenmund Reduction reaction  
(ii) Friedel-Craft's Acylation Reaction  
(iii) Clemmenson's Reduction
- (b) Methanal undergo Cannizzaros reaction due to absence of alpha hydrogen atom.

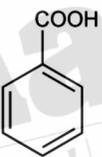
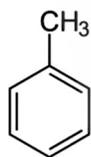
40. (a)



A = Toluene

B = Benzoic acid

C = Benzene



- (b) X= Sodalime (NaOH + CaO), Which acts as De-carboxylating agent.

41. Formula,  $\log K_c = \frac{n \times E_{\text{Cell}}^{\circ}}{0.0591}$

$$\log K_c = \frac{2 \times 0.236}{0.0591}$$

$$\log K_c = 7.986$$

42. Formula,  $\log \frac{K_2}{K_1} = \frac{E_a}{2.303 \times R} \left[ \frac{T_2 - T_1}{T_1 \times T_2} \right]$

$$\log \frac{K_2}{2 \times 10^{-5}} = \frac{209.8 \times 10^3}{2.303 \times 8.314} \left[ \frac{700 - 600}{700 \times 600} \right]$$

$$\log \frac{K_2}{2 \times 10^{-5}} = \frac{1095724.88}{420000}$$

$$\frac{K_2}{2 \times 10^{-5}} = \text{Antilog}(2.61)$$

$$\frac{K_2}{2 \times 10^{-5}} = 407.38$$

$$K_2 = 407.38 \times 2 \times 10^{-5}$$

$$K_2 = 8.147 \times 2 \times 10^{-3}$$

43.  $p = 760 \text{ mm Hg}$   
 $K_H = 4.27 \times 10^5 \text{ mm Hg}$

According to Henry's law,

$$p = K_H \chi$$

$$\Rightarrow \chi = \frac{p}{K_H}$$

$$= \frac{760 \text{ mm Hg}}{4.27 \times 10^5 \text{ mm Hg}}$$

$$= 1.78 \times 10^{-3}$$

$\therefore$  Solubility in terms of mole fraction of methane in benzene is  $1.78 \times 10^{-3}$ .

44.  $\lambda_m^\circ \text{CaCl}_2 = \lambda_m^\circ \text{Ca}^{+2} + 2\lambda_m^\circ \text{Cl}^-$   
 $2\lambda_m^\circ \text{Cl}^- = \lambda_m^\circ \text{CaCl}_2 - \lambda_m^\circ \text{Ca}^{+2}$   
 $2\lambda_m^\circ \text{Cl}^- = 271.6 - 119.0$   
 $2\lambda_m^\circ \text{Cl}^- = 152.5 \text{ Scm}^2 \text{mol}^{-1}$   
 $\Rightarrow \lambda_m^\circ \text{Cl}^- = \frac{152.6}{2} = 76.3 \text{ Scm}^2 \text{mol}^{-1}$

45. Formula of molar mass,  $\pi = \frac{w_B \times R \times T}{M_B \times V}$   
 $\pi = \frac{0.925 \times 8.314 \times 10^3 \times 310}{185000 \times 0.5 \text{ L}} = 25.77 \text{ Pa}$

46. Average Rate =  $-\frac{d[R]}{dt} = -\frac{0.4 - 0.8}{20 - 10}$   
 $= 0.04 \text{ molL}^{-1} \text{min}^{-1}$   
 $= 4 \times 10^{-2} \text{ molL}^{-1} \text{min}^{-1}$   
 $= \frac{0.04}{60} \text{ molL}^{-1} \text{s}^{-1}$   
 $= 0.000666 \text{ molL}^{-1} \text{s}^{-1}$   
 $= 6 \times 10^{-4} \text{ molL}^{-1} \text{s}^{-1}$