

# MOCK TEST PAPER – 3

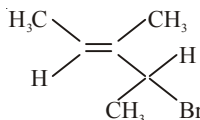
## CBSE XII : CHEMISTRY

Time : 3 Hours

Max. Marks: 70

General Instructions: Same as in Mock Test Paper II.

- Q.1. What is the number of atoms in a body-centred cubic unit cell of a crystal? (1)
- Q.2. What is an emulsion? (1)
- Q.3. Which one has higher electron gain enthalpy with negative sign, sulphur or oxygen? (1)
- Q.4. Give the IUPAC name of the following compound: (1)



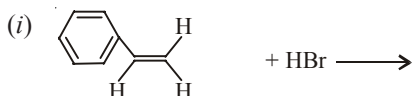
- Q.5. Write the structural formula of : 3-oxopentanal. (1)
- Q.6. Name two metals which occur in nature as oxides. (1)
- Q.7. Arrange the following compounds in an increasing order of their basic strength in aqueous solutions : (1)
- $\text{NH}_3, \text{RNH}_2, \text{R}_2\text{NH}, \text{R}_3\text{N}$
- Q.8. Write the name of an antacid which is often used as a medicine. (1)
- Q.9. Differentiate between molality and molarity of a solution. What is the effect of rise in temperature of molality and molarity of the solution? (1)
- Q.10. Describe the role of the following : (2)
- (i) NaCN in the extraction of silver.
- (ii) CO in the purification of nickel. (2)
- Q.11. Corrosion is essentially an electrochemical phenomenon. With the help of a diagram explain the reactions occurring during the corrosion of iron kept in open atmosphere. (2)

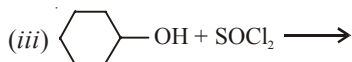
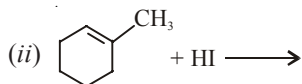
*Or*

Define the term 'molar conductivity' and indicate how molar conductivity of a substance changes with change in concentration of a weak electrolyte and a strong electrolyte in its solution.

- Q.12. Draw the structures of the following molecules: (2)
- (i)  $\text{BrF}_3$
- (ii)  $\text{H}_2\text{S}_2\text{O}_7$
- Q.13. State reasons for the following observations : (2)
- (i) The enthalpies of atomisation of transition elements are quite high.
- (ii) There is a greater horizontal similarity in the properties of the transition elements than of the main group elements.

- Q.14.** Give a chemical equation for each of the following reactions: (2)  
 (i) Williamson's synthesis  
 (ii) Reimer-Tiemann reaction.
- Q.15.** Explain the mechanism of each of the following processes : (2)  
 (i) Acid catalysed dehydration of an alcohol.  
 (ii) Hydration of ethene to yield ethanol.
- Q.16.** Name two water soluble vitamins, state their sources and the diseases caused due to their deficiency in diet. (2)
- Q.17.** What are the following substances? (2)  
 (i) Invert sugar  
 (ii) Polypeptides
- Q.18.** State reasons for the following occurrences : (2)  
 (i) Soaps do not do the cleansing in hard water.  
 (ii) Synthetic detergents are preferred to soaps in washing machines.
- Q.19.** Silver crystallises in face-centred cubic unit cells. Each side of the unit cell has a length of 409 pm. What is the radius of silver atom? (Assume that each face atom is touching the four corner atoms in the unit cell.) (3)
- Q.20.** Calculate the equilibrium constant for the reaction equilibrium: (3)
- $$\text{Fe(s)} + \text{Cd}^{2+}(\text{aq}) \rightleftharpoons \text{Fe}^{2+}(\text{aq}) + \text{Cd(s)}$$
- [Given :  $E_{\text{Cd}^{2+}/\text{Cd}}^{\circ} = -0.40 \text{ V}$ ;  $E_{\text{Fe}^{2+}/\text{Fe}}^{\circ} = -0.44 \text{ V}$ ]
- Q.21.** Calculate the freezing point depression for 0.0711 m aqueous solution of sodium sulphate, if it is completely ionised in solution. If this solution actually freezes at  $-0.320^{\circ}\text{C}$ , what is the value of van't Hoff factor for it at the freezing point? ( $K_f$  for water is  $1.86^{\circ}\text{C molal}^{-1}$ ) (3)
- Q.22.** Describe what is observed when: (3)  
 (i) an electric current is passed through a colloidal solution.  
 (ii) a beam of light is passed through a colloidal solution.  
 (iii) an electrolyte such as NaCl is added to hydrated ferric oxide sol.
- Q.23.** Explain the following observations : (3)  
 (i) With the same  $d$ -orbital configuration ( $d^4$ )  $\text{Cr}^{2+}$  ion is a reducing agent while  $\text{Mn}^{3+}$  ion is an oxidising agent.  
 (ii)  $\text{Cu}^{+}$  ion is not stable in aqueous solutions.  
 (iii) Among the  $3d$  series of transition elements, the largest number of oxidation states are exhibited by manganese.
- Q.24.** Three geometrical isomers are possible for  $[\text{Co}(\text{en})(\text{H}_2\text{O})_2(\text{NH}_3)_2]^{3+}$ . Draw molecular structures of these three isomers and indicate which one of them is chiral. (3)
- Q.25.** Complete the equations for the following reactions : (3)





**Q.26.** How are the following conversions carried out? (3)

- (i) Aniline to Nitrobenzene
- (ii) Ethanamine to N-ethylethanamide
- (iii) Chloroethane to Propan-1-amine

Or

Give one chemical test each to distinguish between the compounds in the following pairs :

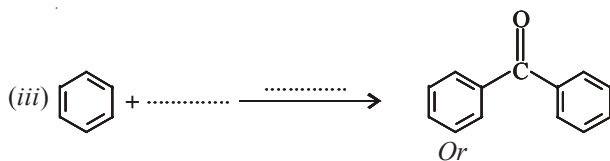
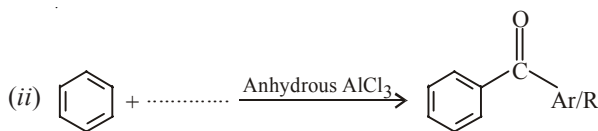
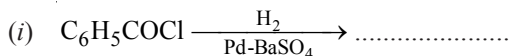
- (i) Methylamine and Dimethylamine
- (ii) Aniline and Benzylamine
- (iii) Ethylamine and Aniline

**Q.27.** Differentiate between the modes of formation of an addition polymer and a condensation polymer. Give one example of each of these formations. (3)

**Q.28.** (a) How are the following obtained? (5)

- (i) Benzoic acid from Ethylbenzene
- (ii) Benzaldehyde from Toluene

(b) Complete each of the following reactions by giving the missing reactant, reagent or product:

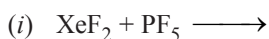


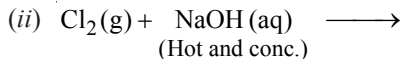
(a) How will you bring about the following conversions?

- (i) Ethanol to 3-Hydroxybutanal
- (ii) Benzaldehyde to Benzophenone

(b) An organic compound A contains 69.77% carbon, 11.63% hydrogen and the rest oxygen. The molecular mass of the compound is 86. It does not react with Tollen's reagent but forms an addition compound with sodium hydrogen sulphite and gives a positive iodoform test. On vigorous oxidation it gives a mixture of ethanoic and propanoic acids. Derive the structure of compound A.

**Q.29.** (a) Complete the following chemical equations : (5)



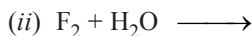
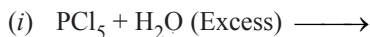


(b) Explain the following observations :

- (i) +3 oxidation state becomes more and more stable from As to Bi in the group.
- (ii) Sulphur in vapour state exhibits paramagnetism.
- (iii) Fluorine does not exhibit any positive oxidation state.

*Or*

(a) Complete the following reaction equations :



(b) Explain the following observations :

- (i) No distinct chemical compound of helium is known.
- (ii) Phosphorus has a greater tendency for catenation than nitrogen.
- (iii) In solution of  $\text{H}_2\text{SO}_4$  in water, the second dissociation constant  $K_{a_2}$ , is less than the first dissociation constant  $K_{a_1}$ .

**Q.30.** (a) A reaction is of second order with respect to a reactant. How is the rate of reaction affected if the concentration of this reactant is: (5)

- (i) doubled
- (ii) reduced to half?

(b) A first order reaction has a rate constant of  $0.0051 \text{ min}^{-1}$ . If we begin with 0.10 M concentration of the reactant, what will be the concentration of the reactant left after 3 hours?

*Or*

(a) Define the following:

- (i) Rate of a reaction
- (ii) Elementary step in a reaction

(b) For a decomposition reaction, the values of rate constant  $k$  at two different temperatures are given below :

$$k_1 = 2.15 \times 10^{-8} \text{ L mol}^{-1} \text{ s}^{-1} \text{ at } 650 \text{ K}$$

$$k_2 = 2.39 \times 10^{-7} \text{ L mol}^{-1} \text{ s}^{-1} \text{ at } 700 \text{ K}$$

Calculate the value of activation energy ( $E_a$ ) for this reaction.

$$(R = 8.314 \text{ J K}^{-1} \text{ mol}^{-1})$$

