SOLUTION TEST-A

1. The reaction given in (ii) is an example of heterogeneous catalysis in which the reactants and catalyst are in different physical states.

   The correct answer is (ii)

2. The extent of adsorption of gas an solid is directly proportional to the critical temperature of the gas.

   The correct answer is (iv)

3. Since the sol move towards the positive plate of an electric field, the sol is negatively charged. The negative charge is due to the adsorption of I^- from excess of KI. The representation of the sol is AgI/I^-.

   The correct answer is (iv)

4. $2MnO_4^- + 5H_2C_2O_4 + 6H^+ \rightarrow 2Mn^{2+} + 10CO_2 + 8H_2O$

   The Mn^{2+} ion formed act as a catalyst.

   This is called auto or self catalysis.

   The correct answer is (i)

5. Potash alum is $K_2SO_4.Al_2(SO_4)_3.24H_2O$

   According to Hardy-Schulze rules, the coagulating power increases as charge on the ion increases. The reason is not the correct explanation of assertion.

   The correct answer is (ii)

6. Starch is more effective in preventing coagulation of $Fe(OH)_3$ sol as starch is lyophilic sold and forms a protective layer around $Fe(OH)_3$ sol.

7. $2AuCl_3 + 3HCHO + 3H_2O \xrightarrow{\text{reduction}} 3HCOOH + 6HCl + 2Au\ (sol)$ **or**

   $2AuCl_3 + 3SnCl_2 \xrightarrow{\text{reduction}} 2Au(sol) + 3SnCl_4$

8. (i) Molybdenum acts as a promoter while carbon monoxide acts as a catalytic poison.

   (ii) Addition of H_2SO_4 provides H^+ ion which catalyse the reaction. Esterification is an example of homogeneous catalysis.

9. The extent of adsorption is expressed as x/m where x is the amount of the adsorbate and m is the amount of the adsorbent. A graph between x/m and P at constant temperature is called **adsorption isotherm**.

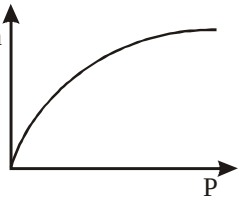
   The relation between x/m and P of a gas is given by $\boxed{\frac{x}{m} = kP^{1/n}}$ $n > 1$

   According to this, x/m increases with increase in P but since n > 1,

   therefore, x/m does not increase as rapidly as P as is evident from the isotherm.

   At high P, x/m is independent of temperature, therefore $\frac{x}{m} = kP^\circ = k_{x/m}$

   $\boxed{\frac{x}{m} = k}$



10. (i) The substances which behave as a normal electrolytes at low concentration but as a colloid at higher concentration due to the formation of micelles are called associated colloids.

    (ii) Dispersed phase: Liquid

    Dispersion medium: Gas

11. (i) Addition of KI to $AgNO_3$ gives yellow precipitate of AgI which then adsorbed Ag^+ ion to form positively charged AgI/Ag^+ sol.

    (ii) $Fe(OH)_3$ sol is positively charged so when NaCl is added, $Fe(OH)_3$ selectively pick up Cl^- and neutralize itself. These neutral molecules then come closer via weak van der Waal forces and form aggregates which finally coagulates.

    (iii) River water is an example of lyophobic sol. When it comes into contact with sea, water electrolytes present in the sea water induce coagulation and results in the formation of deltas.

12. (i) **Peptization** is defined as the process of converting a freshly prepared precipitate into colloidal sol by shaking it with dispersion medium in the presence of a small amount of electrolyte called peptising agent. This method is used to convert freshly prepared precipitate into a colloidal sol.

    (ii) The process of making an emulsion is known as **emulification**.

    (iii) Electrophoresis is the method to determine the charge on the colloidal particles. It involves the movement of colloidal particles either towards the cathode or anode, under the influence of the electric field.

13. (i) The catalytic reaction that depends upon the pore structure of the catalyst and the size of the reactant and product molecules is called **shape selective catalysis**. Zeolites are good shape-selective catalysts used in petrochemical industries for cracking of hydrocarbons and isomerization.

    (ii) **Activity** of a catalyst means to what extent the catalyst will speed up the reaction. The activity of a catalyst depends upon the strength of chemisorption. The activity of a catalyst can be increased by increasing the surface area of catalyst.

    $$2H_2(g) + O_2(g) \xrightarrow{Pt(s)} 2H_2O(l)$$

    Selectivity of a catalyst is its ability to direct a reaction to yield a particular product.

    $$CO(g) + 3H_2(g) \xrightarrow{Ni} CH_4(g) + H_2O(g)$$

    $$CO(g) + 2H_2(g) \xrightarrow{Cu/Zn-Cr_2O_3} CH_3OH(g)$$

    $$CO(g) + H_2(g) \xrightarrow{Cu} HCHO(g)$$

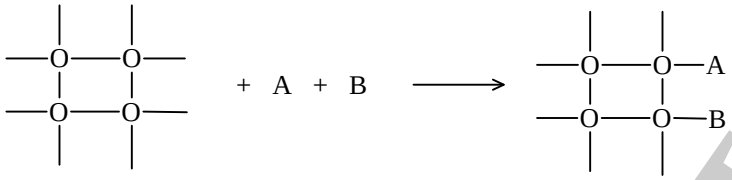
14. (a) (i) In creating high vacuum, charcoal is used to remove last traces of air. It adsorbs the different gases present in air.

    (ii) In froth floatation process, pine oil is used. The oil particles are adsorbed on the surface of the sulphide ore particle leaving behind the gangue particles. The gangue particles remain in the solution while ore particles comes to the surface as froth.

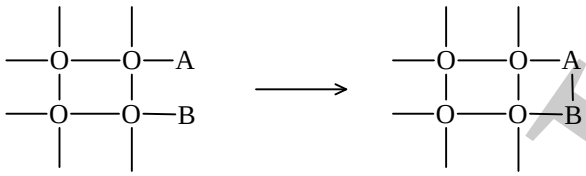
    (b) A relation or graph between x/m and the temperature at a constant pressure is called adsorption isobar.

15. (a) step-(i) is the diffusion of gaseous reactants into the catalytic surface.

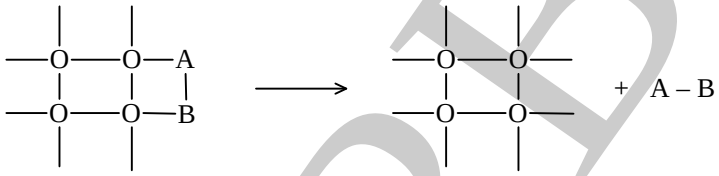
step-(ii) is the adsorption of reactants on the catalyst active site.



step-(iii) is the formation of product



step-(iv) is the desorption of product from the catalyst surface.



(b) Kraft temperature is the temperature above which the formation of micelle takes palace.

(c) Collodion is a sol obtained by the peptization of cellulose acetate with ethyl alcohol and ether.

