## CBSE Test Paper-03

## Class - 12 Chemistry (Surface Chemistry)

1. Adsorption is accompanied by
   a. Decrease in entropy of the system
   b. Decrease in enthalpy of the system
   c. $T\Delta S$ for the process is negative
   d. All are correct
2. Which of the following is most effective electrolyte in causing the flocculation of a negatively charged arsenious sulphide solution?
   a. $MgCl_2$
   b. KCl
   c. $AlCl_3$
   d. $K_3Fe(CN)_6$
3. Decomposition of $H_2O_2$ can be prevented in the presence of
   a. Palladium
   b. Glycerol
   c. Nickel
   d. Sulphuric acid
4. When adsorption of oxalic acid is carried out on activated charcoal, then activated charcoal is known as
   a. Absorption
   b. Adsorbate
   c. Adsorbent
   d. Adsorber
5. Whipped cream is an example of
   a. Solid emulsion
   b. Suspension
   c. Foam
   d. Lyophilic sol
6. What is desorption?

7. What is a protective colloid?
8. Name the factors which influence the extent of adsorption of gas on solid.
9. Why are Lyophillic sols self stabilized?
10. Explain the term dialysis with a suitable example.
11. What is meant by critical micelle concentration?
12. Explain the following terms:
    i. Shape selective catalysis
    ii. Dialysis
13. Action of soap is due to emulsification and micelle formation. Comment.
14. Describe the preparation of the following colloidal solutions. Name the method used in each case.
    i. Silver sol
    ii. Sulphur sol
15. Differentiate between physisorption and chemisorption.

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**Solutions**

1. d. All are correct

   **Explanation:** Adsorption is accompanied by decrease in enthalpy as well as decrease in entropy of the system. Adsorption, therefore, is invariably an exothermic process.

2. c. $AlCl_3$

   **Explanation:** The arsenic sulphide sol has negative charge. The maximum coagulation power for precipitating it is of 0.1 N $AlCl_3$.

3. b. Glycerol

   **Explanation:** Glycerol is an inhibitor. Along with that acetanilide and phosphoric acid can also prevent the same.

   $H_2O_2$ decomposes to water and oxygen in presence of light that's why it is stored in dark glass bottles for this reaction:

   Disproportionation: $O^{-1} \rightarrow O^{-2} + O^0$

   Catalysts - $Fe^{2+}$ , $Fe^{3+}$ , $MnO_2$ , Pt

   Inhibitors: Glycerol inhibits this reaction

4. c. Adsorbent

   **Explanation:** Surface on which adsorption occurs is known as adsorbent.

5. c. Foam

   **Explanation:** Whipped cream is example of foam. It is formed by combination of gas (dispersed phase) and liquid (dispersion medium).

6. The process of removal of adsorbed substance is called desorption.

7. A lyophillic colloid which is used to protect lyophobic colloid from an electrolyte and from getting coagulated, is called protective colloid.

8. Factors affecting on extent of adsorption are as given below:
   i. Nature of adsorbent and adsorbate.

ii. Surface area of solid.
iii. Pressure of gas.
iv. Temperature.

9. It is due to force of attraction between dispersed phase and dispersion medium.

10. Dialysis is the process of removing a dissolved substance from a collidal solution by means of diffusion through a suitable membrane. For example, if egg albumin sol is mixed with sodium chloride solution,$Na^+$ and $Cl^-$ ions will pass through semipermeable membrane whereas pure colloidal solution will be obtained.

11. The micelle may be defined as the aggregated particles formed by associated colloids in solution. The formation of micelle takes place above certain concentration called critical micelle concentration (CMC).

12. i. Shape selective catalysis**:** Shape selective catalysis depends on the pore structure of the catalyst. Zeolites are generally used as catalysts. Depending on the size of the reactant and product molecules compared to the size of the pores of the zeolites, reaction proceed in a particular manner.
    ii. Dialysis: Dialysis is a process to separate a crystalloid from a colloid by diffusion through a semipermeable membrane. When dialysis is carried out under the influence of an electric field this process is called electro dialysis.

13. The cleansing action of soap is due to emulsification and micelle formation. Soaps are basically sodium and potassium salts of long chain fatty acids, $R-COO^-Na^+$. The end of the molecule to which the sodium is attached is polar in nature, while the alkyl-end is non-polar. Thus, a soap molecule contains a hydrophilic (polar) and a hydrophobic (non-polar) part.
    When soap is added to water containing dirt, the soap molecules surround the dirt particles in such a manner that their hydrophobic parts get attached to the dirt molecule and the hydrophilic parts point away from the dirt molecule. This is known as micelle formation. Thus, we can say that the polar group dissolves in water while the non-polar group dissolves in the dirt particle. Now, as these micelles are negatively charged, they do not coalesce and a stable emulsion is formed.

14. i. By reduction: Silver sol is obtained by reduction of dilute silver chloride solution

with stannous chloride.

$$2AgCl + SnCl_2 \rightarrow \underset{Silver\ sol}{2Ag} + SnCl_4$$

ii. By oxidation: Sulphur sol is obtained by passing $H_2S$ gas through an oxidizing agent like bromine water.

$$H_2S + Br_2(aq) \rightarrow \underset{Sulphur\ sol}{S} + 2HBr$$

15.

| Sr. No. | Physisorption | Chemisorption |
|---|---|---|
| 1. | It arises because of Van der Waals forces. | It is caused by chemical bond formation. |
| 2. | It depends on the nature of gas more easily liquefiable gases are adsorbed readily. | It also depends on the nature of gas. Gases which can react with the adsorbent show chemisorption. |
| 3. | It is reversible in nature. | It is irreversible. |
| 4. | It is not specific in nature. | It is highly specific in nature. |
| 5. | Enthalpy of adsorption is low. | Enthalpy of adsorption is high. |
| 6. | High temperature is favourable for adsorption. It increases with the increase of temperature. | High temperature is favourable for adsorption. It increases with the increase of temperature. |
| 7. | No appreciate activation energy is needed. | High activation energy is sometimes needed |