

**CBSE Class 12 physics**  
**Important Questions**  
**Chapter 5**  
**Surface Chemistry**

**2 Marks Questions**

**1. Why do the solution of organic dye turns colourless when charcoal is added?**

**Ans.** Because the molecules of the dye accumulated on the surface of charcoal and turns into the solution colourless.

**2. Define the term – desorption?**

**Ans.** The process of removing an adsorbed substance from a surface on which it is adsorbed is called desorption.

**3. Give two differences between adsorption and absorption ?**

**Ans.**

<u>Adsorption</u>	<u>Absorption</u>
1. It occurs on the surface of the Adsorbent.	1. The molecules of the substance uniformly distributed throughout the body of the solid or liquid.
2. Rate of adsorption decreases until throughout.	2. Rate of absorption is same the equilibrium is reached.

**4. Name the two types of adsorptions ?**

**Ans.** Two types of adsorptions are –

1. Physical adsorption or physisorption .

2. Chemical adsorption or chemisorption .

**5. Write the four differences between physisorption and chemisorption?**

**Ans.**

Physical Adsorption	Chemical Adsorption
1. It is caused by Vander Waals forces. formation.	1. It is caused by chemical bond
2. It is not specific in nature.	2. It is highly specific in nature.
3. It is reversible in nature.	3. It is irreversible.
4. Enthalpy of adsorption is low.	4. Enthalpy of adsorption is high.

**6. ‘Adsorption is an exothermic process ‘. Explain.**

**Ans.** During adsorption, there is always a decrease in residual forces of the surface. Therefore the surface energy decreases which appears as heat. Therefore adsorption is exothermic process.

**7. Explain the Mechanism of adsorption.**

**Ans.** Adsorption arises due to presence of unbalanced forces or residual attractive forces on the particles of the surface. These forces are responsible for attracting the adsorbate particles on its surface and they cause the adsorption.

**8. (a) Which gas is adsorbed more readily on charcoal lump: ammonia or carbon dioxide and why ?**

**(b) Which adsorbs more of carbon monoxide: charcoal lump or charcoal powder & why?**

**Ans.** (a) Ammonia gets adsorbed more readily because it is polar molecule and easily liquifiable.

(b) Charcoal powder adsorbs more of carbon monoxide because it has larger surface area than charcoal lump.

**9. Name the adsorbent used**

- a) To remove coloured impurities from sugar solution.**
- b) In gas masks to remove chlorine.**
- c) To remove moisture from air.**

**Ans.** (a) Activated charcoal

(b) Activated charcoal

(c) Silica gel.

**10. Define the terms – catalysis and catalyst.**

**Ans.** (a) The phenomenon in which a small quantity of a substance known as catalyst alters the rate of a reaction is known as catalysis.

(b) The substance which alter the rate of a reaction and themselves remain chemically and quantitatively unchanged after the reaction are known as catalysts.

**11. What is meant by activity and selectivity of a catalyst?**

**Ans.** Activity of a catalyst is the extent to which a catalyst can increase the rate of reaction. It depends upon the strength of chemisorption. Selectivity of a catalyst is its ability to direct a reaction to yield a particular product. The action of a catalyst is highly selective in nature.

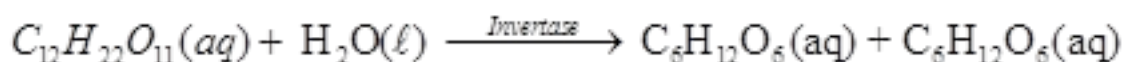
**12. What is shape – selective catalysis? Give an example of shape selective catalyst.**

**Ans.** 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 catalysts due to their honeycomb – like structure. The reactions taking place in zeolites depends upon the size and the shape of reactant and product molecules as well as upon the pores and cavities of the zeolites.

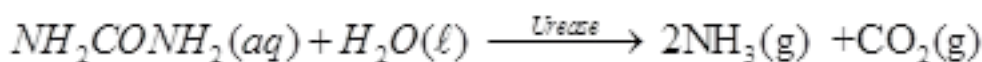
**13. Give two examples of enzyme catalysed reaction.**

**Ans.** Examples of enzyme- catalysed reactions are –

(1) Inversion of cane sugar:



2. Decomposition of urea into ammonia and carbon dioxide.



**14. Write characteristics of enzyme catalysed reactions.**

**Ans.** The characteristics of enzyme catalysed reactions are –

- (1) They are highly efficient and specific in nature.
- (2) They have maximum activity under specific temperature and pH.
- (3) Their activity increases on adding activators and coenzymes while decreases in the presence of poison or inhibitors.

**15. Name some important industrial catalytic process and their catalysts.**

**Ans.**

Process	Catalyst
(i) Haber's process for preparation of ammonia.	(i) Iron , Molybdenum
(ii) Ostwald's process for manufacture of nitric acid.	(ii) Platinised asbestos.
(iii) Contact process for manufacture of sulphuric acid.	(iii) Vanadium pentaoxide( $V_2O_5$ ).

**16. Give two examples of reactions catalysed by zeolites.**

**Ans.** Example of zeolite catalysed reactions are:

- (a) Cracking of hydrocarbons in petroleum industries.
- (b) Conversion of alcohols into gasoline.

**17. What is dispersed phase and dispersion medium in**

**(i) sol (ii) Aerosol (iii) Foam?**

**Ans.**

Dispersion medium	Dispersion phase	Colloid
(i) Solid	(i) Liquid	(i) Sol
(ii) Solid	(ii) Gas	(ii) Aerosol
(iii) Liquid	(iii) Gas	(iii) Aerosol
(iv) Gas	(iv) Liquid	(iv) Foam

**18. Differentiate between multimolecular and macromolecular colloid?**

**Ans.**

<u>Macromolecular colloid</u>	<u>Multimolecular colloid</u>
1. It consist of aggregates of atoms or molecules with diameter less than $10^{-9}\text{m}$ .	1. They are themselves Large.
2. The atoms or molecules are held tog-ether by weak Vander Waal's forces.	2. Since the molecules are flexible. They can take Various shapes.
3. Example - Gold sol, sulphur sol.	3. Example – starch, proteins.

**19. What are associated colloids? Give an example?**

**Ans.** The substances, which at low concentration behave as normal electrolyte but at higher concentration exhibit colloidal behavior due to formation of aggregates, are called associated colloids. For example – soaps and detergents. They are also called micelle.

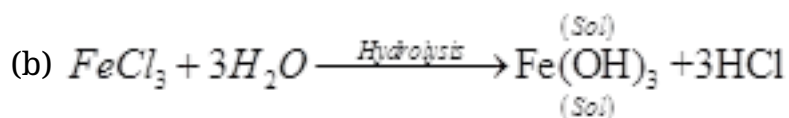
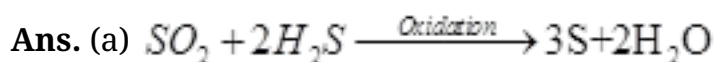
**20. What is CMC and Kraft's temperature?**

**Ans.** CMC or critical micelle concentration and Kraft's temperature are the concentration and temperature above which micelle formation or associated colloid formation takes place.

**21. Write the equation for formation of**

**(a) Sulphur sol.**

**(b) Ferric hydroxide sol.**



**22. Define the term peptization?**

**Ans.** The process of converting a precipitate into colloidal sol by shaking it with dispersion medium in the presence of small amount of electrolyte is called peptisation.

**23. How is a colloidal solution purified by dialysis?**

**Ans.** Dialysis is a process of removing a dissolved substance from a colloidal solution by means of diffusion through a suitable membrane. A bag of suitable membrane containing the colloidal solution is suspended in a vessel through which fresh water is continuously flowing. The molecules and ions diffuse through membrane into outer water and pure colloidal solution is left behind

**24. What is observed when light is passed through a colloidal solution?**

**Ans.** When light is passed through a colloidal solution, the colloidal particles scattered the light and the path of light gets illuminated and a bright cone of light is observed due to scattering of light in all direction. This is called Tyndal effect.

**25. Define the terms – (a) Brownian movement (b) Electrophoresis?**

**Ans.** (a) Brownian movement:-

The continuous zig-zag movement of particles in a colloidal solution is called Brownian movement.

(b) Electrophoresis:-

The movement of particles under an applied electric potential is called electrophoresis.

**26. Alum is used for purification of water. Why?**

**Ans.** The dirty water contains electrically charged impurities which get coagulated on adding alum which contains  $Al^{3+}$  ion. These impurities settle down after coagulation and are then filtered.

**27. Give three applications of colloidal solutions?**

**Ans.** Application of colloids-

1. Colloidal antimony is used in curing kalaazar.
2. Paints, synthetic plastics, rubber etc. all are colloidal solutions.
3. Rubber is obtained by coagulation of latex.

**28. What are the two types of emulsions?**

**Ans.** The two types of emulsions are-

- (a) Oil dispersed in water (o/w type)
- (b) Water dispersed in oil (w/o type)

**29. How does an emulsifying agent work? Give an example of emulsifying agent.**

**Ans.** An emulsifying agent is added to emulsions for its stabilization. It forms an interfacial film between suspended particles and the medium eg. For o/w emulsions, Proteins, gums soaps etc. can be used as an emulsifying agent whereas for w/o long chain alcohols lamp black etc. can be used.

**30. Write any two characteristics of Chemisorption.**

**Ans. 1.** Chemisorption is highly specific in nature. It occurs only if there is a possibility of chemical bonding between the adsorbent and the adsorbate.

**2.** Like physisorption, chemisorption also increases with an increase in the surface area of the adsorbent.

**31. Why does physisorption decrease with the increase of temperature?**

**Ans.** Physisorption is exothermic in nature. Therefore, in accordance with Le-Chatelier's

principle, it decreases with an increase in temperature. This means that physisorption occurs more readily at a lower temperature.

**32. Why are powdered substances more effective adsorbents than their crystalline forms?**

**Ans.** Powdered substances are more effective adsorbents than their crystalline forms because when a substance is powdered, its surface area increases and physisorption is directly proportional to the surface area of the adsorbent.

**33. Why is the ester hydrolysis slow in the beginning and becomes faster after sometime?**

**Ans.** Ester hydrolysis can be represented as:  $\text{Ester} + \text{Water} \rightarrow \text{Acid} + \text{Alcohol}$

The acid produced in the reaction acts as a catalyst and makes the reaction faster. Substances that act as catalysts in the same reaction in which they are obtained as products are known as autocatalysts.

**34. What modification can you suggest in the Hardy-Schulze law?**

**Ans.** Hardy-Schulze law states that 'the greater the valence of the flocculating ion added, the greater is its power to cause precipitation.'

This law takes into consideration only the charge carried by an ion, not its size. The smaller the size of an ion, the more will be its polarising power. Thus, Hardy-Schulze law can be modified in terms of the polarising power of the flocculating ion. Thus, the modified Hardy-Schulze law can be stated as 'the greater the polarising power of the flocculating ion added, the greater is its power to cause precipitation.'

**35. Why is it essential to wash the precipitate with water before estimating it quantitatively?**

**Ans.** When a substance gets precipitated, some ions that combine to form the precipitate get adsorbed on the surface of the precipitate. Therefore, it becomes important to wash the precipitate before estimating it quantitatively in order to remove these adsorbed ions or other such impurities.



**36. Give reason why a finely divided substance is more effective as an adsorbent.**

**Ans.** Adsorption is a surface phenomenon. Therefore, adsorption is directly proportional to the surface area. A finely divided substance has a large surface area. Both physisorption and chemisorption increase with an increase in the surface area. Hence, a finely divided substance behaves as a good adsorbent.

**37. What do you understand by activation of adsorbent? How is it achieved?**

**Ans.** By activating an adsorbent, we tend to increase the adsorbing power of the adsorbent. Some ways to activate an adsorbent are:

- (i) By increasing the surface area of the adsorbent. This can be done by breaking it into smaller pieces or powdering it.
- (ii) Some specific treatments can also lead to the activation of the adsorbent. For example, wood charcoal is activated by heating it between 650 K and 1330 K in vacuum or air. It expels all the gases absorbed or adsorbed and thus, creates a space for adsorption of gases.

**38. Discuss the effect of pressure and temperature on the adsorption of gases on solids.**

**Ans. Effect of pressure**

Adsorption is a reversible process and is accompanied by a decrease in pressure. Therefore, adsorption increases with an increase in pressure.

**Effect of temperature**

Adsorption is an exothermic process. Thus, in accordance with Le-Chatelier's principle, the magnitude of adsorption decreases with an increase in temperature.

**39. What are emulsions? What are their different types? Give example of each type.**

**Ans.** The colloidal solution in which both the dispersed phase and dispersion medium are liquids is called an emulsion.

There are two types of emulsions:

**(a) Oil in water type:**

Here, oil is the dispersed phase while water is the dispersion medium. For example: milk, vanishing cream, etc.

**(b) Water in oil type:**

Here, water is the dispersed phase while oil is the dispersion medium. For example: cold cream, butter, etc.

**40. Describe some features of catalysis by zeolites.**

**Ans.** Zeolites are alumino-silicates that are micro-porous in nature. Zeolites have a honeycomb-like structure, which makes them shape-selective catalysts. They have an extended 3D-network of silicates in which some silicon atoms are replaced by aluminium atoms, giving them an Al-O-Si framework. The reactions taking place in zeolites are very sensitive to the pores and cavity size of the zeolites. Zeolites are commonly used in the petrochemical industry.

**41. What is shape selective catalysis?**

**Ans.** A catalytic reaction which depends upon the pore structure of the catalyst and on the size of the reactant and the product molecules is called shape-selective catalysis. For example, catalysis by zeolites is a shape-selective catalysis. The pore size present in the zeolites ranges from 260-740 pm. Thus, molecules having a pore size more than this cannot enter the zeolite and undergo the reaction.

**42. Give four uses of emulsions.**

**Ans. Four uses of emulsions:**

- (i) Cleansing action of soaps is based on the formation of emulsions.
- (ii) Digestion of fats in intestines takes place by the process of emulsification.
- (iii) Antiseptics and disinfectants when added to water form emulsions.
- (iv) The process of emulsification is used to make medicines.

**43. Comment on the statement that "colloid is not a substance but a state of substance".**

**Ans.** Common salt (a typical crystalloid in an aqueous medium) behaves as a colloid in a benzene medium. Hence, we can say that a colloidal substance does not represent a separate class of substances. When the size of the solute particle lies between 1 nm and 1000 nm, it behaves as a colloid.

Hence, we can say that colloid is not a substance but a state of the substance which is dependent on the size of the particle. A colloidal state is intermediate between a true solution and a suspension.