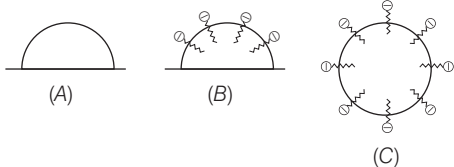


Chapter_05

Surface Chemistry

Practice Questions

- In case of adsorption,
 - a particle present in the bulk experience an unbalanced force
 - unbalanced forces are responsible for the interaction between adsorbate and adsorbent
 - extent of adsorption increases with increase of surface area per unit mass of adsorbent at a given temperature and pressure
 - All of the above
- Which of the following activity does not take place at the time of adsorption?
 - Residual attractive forces decreases
 - Surface energy decreases
 - Heat releases
 - Heat is absorbed
- In Freundlich adsorption isotherm, the value of $\frac{1}{n}$ is
 - between 0 and 1 in all cases
 - between 2 and 4 in all cases
 - 1 in case of physical adsorption
 - 1 in case of chemisorption
- When pressure is low, the fraction of the surface covered during adsorption follows:
 - Zero order kinetics
 - First order kinetics
 - Second order kinetics
 - Fractional order kinetics
- Which of the following is/are generally used for the removal of the coloured impurities from the solutions?
 - Charcoal
 - Silica gel
 - Both (a) and (b)
 - Anhyd. CaCl_2
- Which of the following substance acts as a catalyst for the following reaction?
$$2\text{KClO}_3 \longrightarrow 2\text{KCl} + 3\text{O}_2$$
 - MnO_2
 - O_2
 - HCl
 - All of these
- Which of the following are the examples of heterogeneous catalysis?
 - Haber's process
 - Ostwald's process
 - Oxidation of SO_2 into SO_3 in presence of Pt
 - All of the above
- The activity of a catalyst depends upon the strength of
 - chemisorption
 - physisorption
 - solution
 - None of the above
- The enzyme invertase converts the cane sugar into
 - glucose
 - fructose
 - glucose + fructose
 - None of the above
- Activators promoting catalytic actions are generally
 - metal ions
 - non-metal ions
 - metalloids ions
 - All of the above
- Lyophobic colloids are not stable because
 - they coagulate by heating them or with the addition of electrolytes
 - they coagulate by freezing them or with the addition of electrolytes
 - they do not coagulate by freezing them with the electrolytes
 - they do not coagulate by heating them with the electrolytes
- Gold sols and sulphur sols are the examples of
 - multimolecular colloids
 - macromolecular colloids
 - associated colloids
 - All of the above
- In the cleansing action of soaps represented by the given figures,
 - aggregated colloids
 - macromolecular colloids
 - Both (a) and (b)
 - multimolecular colloids
- Which of the following processes is involved in Bredig's arc method?
 - Only dispersion
 - Only condensation
 - Dispersion as well as condensation
 - Diffusion
- Purification of the colloidal solution is carried out by
 - dialysis
 - electrodialysis
 - ultrafiltration
 - All of these
- Tyndall effect is observed only, when
 - the diameter of the dispersed particles is not much smaller than the wavelength of light used.
 - there is high difference between the refractive indices (μ) of the dispersion medium and dispersed phase.
 - refractive indices (μ) of both dispersed medium and dispersed phase are equal to each other.
 - Both (a) and (b)
- Which property of colloidal solutions is independent of charge on the colloidal particles?
 - Coagulation
 - Electrophoresis
 - Electroosmosis
 - Tyndall effect

- 18.** Which of the following is an example of the negatively charged sols?
- (a) $\text{FeCl}_3 + \text{NaOH}$
 - (b) $\text{FeCl}_3 + \text{hot water}$
 - (c) When Ag^+ is absorbed by AgI in solution of AgNO_3 and KI
 - (d) All of the above
- 19.** Which of the following is the most acceptable reason to explain the charge on sol particles?
- (a) Electron capture by sol particles during electrodispersion
 - (b) Preferential adsorption of ions from solution
 - (c) Formulation of electrical double layer
 - (d) None of the above
- 20.** The potential difference between the fixed layer and diffused layer of opposite charges in the colloidal system is known as
- (a) Zeta potential
 - (b) gravitational potential
 - (c) standard potential
 - (d) ionic potential
- 21.** Lyophilic sols are more stable than lyophobic sols because
- (a) lyophobic sols are extensively solvated
 - (b) lyophilic sols are extensively solvated
 - (c) lyophilic sols are negatively charged
 - (d) lyophilic sols are reversible in nature
- 22.** Butter and cream are the examples of
- (a) w/o type emulsion
 - (b) o/w type emulsion
 - (c) Both (a) and (b)
 - (d) None of these
- 23.** An emulsions cannot be broken by
- (a) adding more amount of dispersion medium
 - (b) freezing
 - (c) adding emulsifying agent
 - (d) Both (a) and (c)
- 24.** Smoke is precipitated by the
- (a) Cottrell precipitator
 - (b) colloidal precipitator
 - (c) natural precipitator
 - (d) Planck's precipitator
- 25.** Medicines are more effective in their colloidal form because
- (a) in such condition, these gets easily precipitated in the blood
 - (b) in this state, these are more stable
 - (c) in this state, they have large surface area and hence, get easily assimilated
 - (d) All of the above

ANSWERS

1. (d)	2. (d)	3. (a)	4. (b)	5. (a)	6. (a)	7. (d)	8. (a)	9. (c)	10. (a)
11. (a)	12. (a)	13. (a)	14. (c)	15. (d)	16. (d)	17. (d)	18. (a)	19. (b)	20. (a)
21. (b)	22. (a)	23. (d)	24. (a)	25. (c)					

Hints & Solutions

2. (d) During adsorption, there is always a decrease in the residual forces of the surface, i.e. there is decrease in surface energy which appears as heat and, thus heat is released.

Therefore, adsorption is an exothermic process.
i.e. $\Delta H = -ve$ (always).

3. (a) In Freundlich adsorption isotherm,

$$\frac{x}{m} = kp^{1/n}$$

where, x = amount of adsorbate

m = amount of adsorbent

The value of n is always greater than 1.

So, the value of $1/n$ lies between 0 and 1 in all cases.

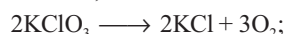
4. (b) At low pressure, curve is almost straight line, i.e.

$$\frac{x}{m} \propto p \text{ or } \frac{x}{m} = kp$$

Hence, it follows first order kinetics.

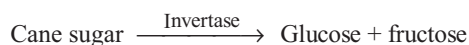
5. (a) Animal charcoal removes coloured impurities of solutions by adsorbing.

6. (a) In the given reaction,



When little amount of MnO_2 is added, the decomposition takes place at lower temperature and rate of reaction also increases. Moreover, amount of MnO_2 remains unchanged during the reaction.

9. (c) The enzyme invertase converts the cane sugar into glucose and fructose. i.e.



10. (a) Activators promoting catalytic actions are generally metal ions (Na^+ , Mn^{2+} , Co^{2+} , Cu^{2+}). These get weakly bonded to enzyme molecules and therefore promote catalytic action.
11. (a) Lyophobic colloids are readily precipitated (or coagulated) on addition of small amounts of electrolytes or by heating, hence they are not stable.

12. (a) Sulphur sol (consists of particles containing a thousands or more of S_8 sulphur molecules) and gold sol (containing particles of various sizes having many atoms) are the examples of multimolecular colloids.

13. (a) In the given figures, Fig. C shows the structure of aggregated colloids or micelles.

14. (c) **Bredig's arc method** involves the process of both dispersion as well as condensation. Colloidal sols of metals such as gold, silver, platinum etc., can be prepared by this method.

16. (d) **Tyndall effect** is the scattering of light by sol particles, which cannot be affected by charge on them.

Other given options such as coagulation, electrophoresis and electroosmosis depend on charge particles.

Thus, option (d) is correct.

18. (a) Mixture of FeCl_3 and NaOH form the negatively charged sol, while other given forms are positively charged sols.

19. (b) The sol particles acquire positive or negative charge by preferential adsorption of the positive or negative from solution.

20. (a) The potential difference between fixed layer and diffused layer of opposite charges of a colloidal sol is termed as **electrokinetic** or **Zeta potential**.

22. (a) Butter and cream are the examples of w/o type emulsions in which water acts as dispersed phase and oil as a dispersion medium.

23. (d) Emulsions are liquid-liquid colloidal system. They cannot be broken by adding more amount of dispersion medium and adding emulsifying agent as on adding more amount of dispersion medium they become dilute and on adding emulsifying agent they get stabilised.

24. (a) Smoke is precipitated by the cottrell precipitator. The smoke particles on coming in contact with Cottrell precipitator plates, lose their charge and get precipitated.