

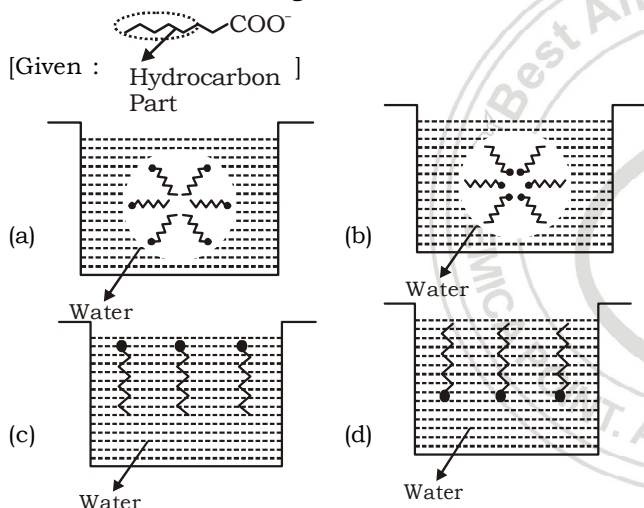
Instructor: **ER. S. K. SINGH (B. Tech, M.Tech) M.N.N.I.T. Aild.**

1. The Tyndall effect is observed only when following conditions are satisfied:

- The diameter of the dispersed particles is much smaller than the wavelength of the light used.
- The diameter of the dispersed particles is not much smaller than the wavelength of the light used.
- The refractive indices of the dispersed phase and dispersion medium are almost similar in magnitude.
- The refractive indices of the dispersed phase and dispersion medium differ greatly in magnitude.

- (a) (ii) & (iv)                      (b) (i) & (iii)  
(c) (ii) & (iii)                     (d) (i) & (iv)

2. Above 'CMC' correct diagram for micelle formation is



3. In comparison to the zeolite process for the removal of permanent hardness, the synthetic resins method is:

- less efficient as the resins cannot be regenerated
- less efficient as it exchanges only anions
- more efficient as it can exchange only cations
- more efficient as it can exchange both cations as well as anions.

4. The aerosol is a kind of colloid in which

- solid is dispersed in gas
- gas is dispersed in solid
- liquid is dispersed in water
- gas is dispersed in liquid

5. 10 mL of 1 mM surfactant solution forms a monolayer covering 0.24 cm<sup>2</sup> on a polar substrate. If the polar head is approximated as a cube, what is its edge length

- (a) 2.0 pm                              (b) 2.0 nm  
(c) 0.1 nm                              (d) 1.0 pm

6. Match the catalysts (Column I) with products (Column II).

**Column I  
Catalyst**

- (A) V<sub>2</sub>O<sub>5</sub>  
(B) TiCl<sub>4</sub>/Al(Me)<sub>3</sub>  
(C) PdCl<sub>2</sub>  
(D) Iron Oxide

**Column II  
Product**

- (i) Polyethylene  
(ii) Ethanal  
(iii) H<sub>2</sub>SO<sub>4</sub>  
(iv) NH<sub>3</sub>

- (a) (A) - (iv) ; (B) - (iii) ; (C) - (ii) ; (D) - (i)  
(b) (A) - (iii) ; (B) - (iv) ; (C) - (i) ; (D) - (ii)  
(c) (A) - (iii) ; (B) - (i) ; (C) - (ii) ; (D) - (iv)  
(d) (A) - (ii) ; (B) - (iii) ; (C) - (i) ; (D) - (iv)

7. The correct option among the following is:

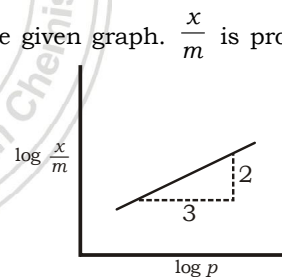
(a) Colloidal medicines are more effective because they have small surface area.

(b) Colloidal particles in lyophobic sols can be precipitated by electrophoresis.

(c) Brownian motion in colloidal solution is faster if the viscosity of the solution is very high.

(d) Addition of alum to water makes it unfit for drinking.

8. Adsorption of a gas follows Freundlich adsorption isotherm  $x$  is the mass of the gas adsorbed on mass  $m$  of the adsorbent. The plot of  $\log \frac{x}{m}$  versus  $\log p$  is shown in the given graph.  $\frac{x}{m}$  is proportional to



- (a)  $p^{3/2}$                               (b)  $p^3$                               (c)  $p^{2/3}$                               (d)  $p^2$

9. 0.27 g of a long chain fatty acid was dissolved in 100 cm<sup>3</sup> of hexane. 10 mL of this solution was added dropwise to the surface of water in a round watch glass. Hexane evaporates and a monolayer is formed. The distance from edge to centre of the watch glass is 10 cm. What is the height of the monolayer? [Density of fatty acid = 0.9 g cm<sup>-3</sup>;  $\pi = 3$ ]

- (a) 10<sup>-8</sup> m                              (b) 10<sup>-4</sup> m  
(c) 10<sup>-2</sup> m                              (d) 10<sup>-6</sup> m

10. Peptization is a:

(a) Process of converting a colloidal solution into precipitate

(b) Process of converting precipitate into colloidal solution

(c) Process of converting soluble particles to form colloidal solution

(d) Process of bringing colloidal molecule into solution.

11. Among the following, the INCORRECT statement about colloids is
- They can scatter light
  - The range of diameters of colloidal particles is between 1 and 1000 nm.
  - The osmotic pressure of a colloidal solution is of higher order than the true solution at the same concentration.
  - They are larger than small molecules and have high molar mass.
12. A gas undergoes physical adsorption on a surface and follows the given Freundlich adsorption isotherm equation  $\frac{x}{m} = kp^{0.5}$
- Adsorption of the gas increases with:
- Increase in  $p$  and decrease in  $T$
  - decrease in  $p$  and decrease in  $T$
  - increase in  $p$  and increase in  $T$
  - decrease in  $p$  and increase in  $T$ .
13. Which is not correct for physical adsorption?
- Adsorption is spontaneous
  - Both enthalpy and entropy of adsorption are negative
  - Adsorption on solid is reversible
  - Adsorption increases with increase in temperature
14. For a linear plot of  $\log(x/m)$  versus  $\log p$  in a Freundlich isotherm, which of the following statements is correct? ( $k$  and  $n$  are constants)
- $\log(1/n)$  appears as the intercept
  - Both  $k$  and  $1/n$  appear in the slope term
  - $1/n$  appears as the intercept
  - Only  $1/n$  appears as the slope.
15. Match the catalysts to the correct processes:
- | Catalyst     | process                           |
|--------------|-----------------------------------|
| (A) $TiCl_4$ | (i) Wacker process                |
| (B) $PdCl_2$ | (ii) Zeigler-Natta polymerisation |
| (C) $CuCl_2$ | (iii) Contact process             |
| (D) $V_2O_5$ | (iv) Deacon's process             |
- (A) - (ii), (B) - (iii), (C) - (iv), (D) - (i)
  - (A) - (iii), (B) - (ii), (C) - (iv), (D) - (i)
  - (A) - (ii), (B) - (i), (C) - (iv), (D) - (iii)
  - (A) - (ii), (B) - (i), (C) - (ii), (D) - (iv)
16. 3 g of activated charcoal was added to 50 mL of acetic acid solution (0.06 N) in a flask. After an hour it was filtered and the strength of the filtrate was found to be 0.042 N. The amount of acetic acid adsorbed (per gram of charcoal) is:
- 18 mg
  - 36 mg
  - 42 mg
  - 54 mg
17. The coagulating power of electrolytes having ions  $Na^+$ ,  $Al^{3+}$  and  $Ba^{2+}$  for arsenic sulphide sol increases in the order:
- $Al^{3+} < Na^+ < Ba^{2+}$
  - $Al^{3+} < Ba^{2+} < Na^+$
  - $Na^+ < Ba^{2+} < Al^{3+}$
  - $Ba^{2+} < Na^+ < Al^{3+}$
18. According to Freundlich adsorption isotherm, which of the following is correct?
- $\frac{x}{m} \propto p^1$
  - $\frac{x}{m} \propto p^{1/n}$
  - $\frac{x}{m} \propto p^0$
- (d) All the above are correct for different ranges of pressure.
19. Which of the following statements is incorrect regarding physisorption?
- It occurs because of van der Waals forces.
  - More easily liquefiable gases are adsorbed readily.
  - Under high pressure it results into multi molecular layer on adsorbent surface.
  - Enthalpy of adsorption ( $\Delta H_{\text{adsorption}}$ ) is low and positive.
20. Gold numbers of protective colloids A, B, C and D are 0.50, 0.01, 0.10 and 0.005, respectively. The correct order of their protective powers is:
- $D < A < C < B$
  - $C < B < D < A$
  - $A < C < B < D$
  - $B < D < A < C$
21. Plot of  $\log x/m$  against  $\log P$  is a straight line inclined at an angle of  $45^\circ$ . When the pressure is 0.5 atm and Freundlich parameter  $k$  is 10, the amount of solute adsorbed per gram of adsorbent will be:
- 1 g
  - 2 g
  - 3 g
  - 5 g
22. In Langmuir's model of adsorption of a gas on a solid surface:
- The mass of gas striking a given area of surface is independent of the pressure of the gas
  - The rate of dissociation of adsorbed molecules from the surface does not depend on the surface covered
  - The adsorption at a single site on the surface may involve multiple molecules at the same time.
  - The mass of the gas striking a given area of surface is proportional to the pressure of the gas
23. The dispersed phase in colloidal iron (III) hydroxide and colloidal gold is positively and negatively charged respectively. Which of the following statement is not correct?
- Magnesium chloride solution coagulates gold sol less readily than iron (III) hydroxide sol
  - Sodium sulphate solution causes coagulation in both sol
  - Mixing of the two sols has no effect
  - Coagulation in both sol can be brought about by electrophoresis.
24. The volume of colloidal particles,  $V_c$  as compared to the volume of solute particles in true solution,  $V_s$  could be:
- $\sim 1$
  - $\sim 10^{+23}$
  - $\sim 10^{-3}$
  - $\sim 10^3$
25. Identify the correct statement regarding enzymes:
- Enzymes are specific biological catalysts that possess well defined active sites
  - Enzymes are normally heterogeneous catalysts that are very specific in their action
  - Enzymes are specific biological catalysts that cannot be poisoned
  - Enzymes are specific biological catalysts that can normally function at very high temperature ( $T = 1000$  K)