# SURFACE CHEMISTRY

1. Among the following, the false statement is :

(1) Latex is a colloidal solution of rubber particles which are positively charged

(2) Tyndall effect can be used to distinguish between a colloidal solution and a true solution.

(3) It is possible to cause artificial rain by throwing electrified sand carrying charge opposite to the one on clouds from an aeroplane.

(4) Lyophilic sol can be coagulated by adding an electrolyte.

2. The combination of plots which does not represent isothermal expansion of an ideal gas is:

(A)

(B)

(C)

(D)
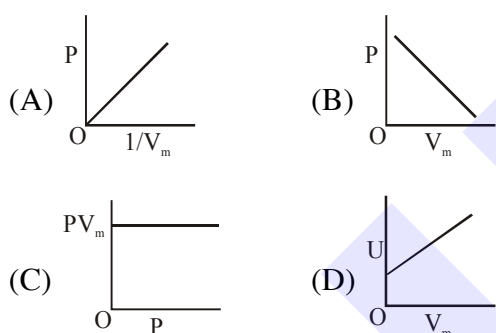
(1) (A) and (C)   (2) (A) and (D)

(3) (B) and (D)   (4) (B) and (C)

3. An example of solid sol is :

(1) Butter   (2) Gem stones

(3) Paint   (4) Hair cream

4. Among the colloids cheese (C), milk (M) and smoke (S), the correct combination of the dispersed phase and dispersion medium, respectively is :-

(1) C : solid in liquid; M : solid in liquid ; S : solid in gas

(2) C : solid in liquid; M : liquid in liquid ; S : gas in solid

(3) C : liquid in solid; M : liquid in solid ; S : solid in gas

(4) C : liquid in solid; M : liquid in liquid ; S : solid in gas

5. Adsorption of a gas follows Freundlich adsorption isotherm. In the given plot, x is the mass of the gas adsorbed on mass m of the adsorbent at pressure p. $\dfrac{x}{m}$ is proportional to
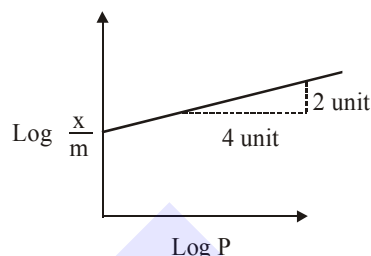

(1) $P^{1/4}$ (2) P^2 (3) P   (4) $P^{1/2}$

6. Haemoglobin and gold sol are examples of :

(1) negatively charged sols

(2) positively charged sols]

(3) negatively and positively charged sols, respectively

(4) positively and negatively charged sols, respectively

7. 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 $\log \dfrac{x}{m}$ versus log p is shown in the given graph. $\dfrac{x}{m}$ is proportional to :
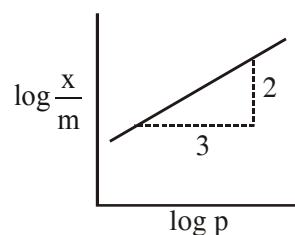
(1) $p^{3/2}$ (2) p^3 (3) $p^{2/3}$ (4) p^2

8. The aerosol is a kind of colloid in which :

(1) gas is dispersed in solid

(2) solid is dispersed in gas

(3) liquid is dispersed in water

(4) gas is dispersed in liquid

9. 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 :
(1) Decrease in p and decrease in T
(2) Increase in p and increase in T
(3) Increase in p and decrease in T
(4) Decrease in p and increase in T

10. The correct option among the following is :
(1) Colloidal particles in lyophobic sols can be precipiated by electrophoresis.
(2) Brownian motion in colloidal solution is faster the viscosity of the solution is very high.
(3) Colloidal medicines are more effective because they have small surface area.
(4) Addition of alum to water makes it unfit for drinking.

11. Peptization is a :
(1) process of converting a colloidal solution into precipitate
(2) process of converting precipitate into colloidal solution
(3) process of converting soluble particles to form colloidal solution
(4) process of bringing colloidal molecule into solution

**12.** Among the following, the INCORRECT statement about colloids is :
(1) They can scatter light
(2) They are larger than small molecules and have high molar mass
(3) The range of diameters of colloidal particles is between 1 and 1000 nm
(4) The osmotic pressure of a colloidal solution is of higher order than the true solution at the same concentration

13. 10 mL of 1mM surfactant solution forms a monolayer covering 0.24 cm^2 on a polar substrate. If the polar head is approximated as cube, what is its edge length?
(1) 2.0 pm   (2) 2.0 nm
(3) 1.0 pm   (4) 0.1 nm

14. For coagulation of arsenious sulphide sol, which one of the following salt solution will be most effective
(1) $AlCl_3$ (2) NaCl
(3) $BaCl_2$ (4) Na_3PO_4

SOLUTION

1.   Ans. (1)

Colloidal solution fo rubber are negatively charged.

2.   Ans. (3)

Isothermal expansion $PV_m = K$(Graph-C)

$$P = \frac{K}{V_m} \text{ (Graph-A)}$$
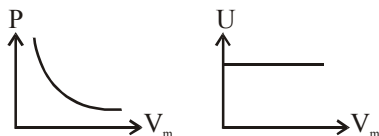
3.   Ans. (2)

4.   Ans. (4)

	Dispersed Phase	**Dispersion Medium**
Cheese	Liquid	Solid
Milk	Liquid	Liquid
Smoke	Solid	Gas

5.   Ans. (4)

$$\frac{x}{m} = K \times P^{1/n}$$

$$\log\frac{x}{m} = \log K + \frac{1}{n}\log P$$

$$m = \frac{1}{n} = \frac{2}{4} = \frac{1}{2} \Rightarrow n = 2$$

So, $\dfrac{x}{m} = K \times P^{1/2}$

6.   Ans.(4)

Haemoglobin $\longrightarrow$ positive sol

Gold sol $\longrightarrow$ negative sol

7.   Ans. (3)

Sol. $\dfrac{x}{m} = K.p^{1/n}$

$\therefore \log \dfrac{x}{m} = \log K + \dfrac{1}{n}.\log P$

slope $= \dfrac{1}{n} = \dfrac{2}{3}$

$\therefore \dfrac{x}{m} = K.p^{2/3}$

Correct option : (3)

8.   Ans. (2)

Aerosol is suspension of fine solid or liquid particles in air or other gas.

Ex. Fog, dust, smoke etc

$\therefore$ Ans.(2)

9.   Ans. (3)

Freundlich adsorption isotherm $\dfrac{x}{m} = Kp^{0.5}$

so on increasing pressure, $\dfrac{x}{m}$ increases

physical adsorption decreases with increase in temperature so option (3) is correct.

10.   Ans. (1)

Sol.   In electrophoresis precipitation occurs at the electrode which is oppositely charged therefore (1) is correct.

11.   Ans. (2)

12.   Ans. (4)

Colligative properties of colloidal solution are smaller than true solution

13.   Ans. (1)

Millimoles $= 10 \times 10^{-3} = 10^{-2}$

Moles $= 10^{-5}$

No. of molecules $= 6 \times 10^{23} \times 10^{-5} = 6 \times 10^{+18}$

surface area occupied by one molecule

$= \dfrac{0.24}{6 \times 10^{18}} = 0.04 \times 10^{-18} \text{cm}^2$

$4 \times 10^{-20} = a^2$

$a = 2 \times 10^{-10}\text{cm} = 2\text{pm}$

14.   Ans. (1)

Sulphide is –ve charged colloid so cation with maximum charge will be most effective for coagulation.

$Al^{3+} > Ba^{2+} > Na^+$ coagulating power.