

## Surface Chemistry

### Adsorption physisorption and chemisorptions: factors affecting adsorption of gases on solids

#### Previous Competitive Questions

1. If  $x$  is the amount of adsorbate and  $m$  is the amount of adsorbent, which of the following relations is not related to adsorption process? [CBSE AIPMT-2011]

1)  $\frac{x}{m} = p \times T$

2)  $\frac{x}{m} = f(p)$  at constant  $T$

3)  $\frac{x}{m} = f(T)$  at constant  $p$

4)  $p = f\left(\frac{x}{m}\right)$  at constant  $T$

2. Choose the incorrect statement in respect of physisorption. [Kerala CEE-2011]

- 1) It is not specific in nature.
- 2) It arises because of Vander Waals' forces.
- 3) It is reversible in nature.
- 4) No appreciable activation energy is needed.

5) Enthalpy of adsorption is in the range  $80 - 240 \text{ kJ mol}^{-1}$ .

3. Pieces of wood burn faster than a log of wood of the same mass because

[RPMT-2010]

- 1) Surface area of log of wood is larger and needs more time to burn.
- 2) Pieces of wood have large surface area.
- 3) All pieces of wood catch fire at the same time.
- 4) Block of wood has higher density than pieces of the same wood.

4. Which of the following is a wrong statement for physisorption?

- 1) It is a reversible reaction.
- 2) Reaction requires energy of activation.
- 3) The value of adsorption enthalpy is low.
- 4) It generally occurs at a low temperature.

**KEY**

1) 1

2) 5

3) 2

4) 2

**Catalysis Homogenous and Heterogeneous Activity and Selectivity, Enzyme  
Catalysis**

1. For the following reaction,



Which one of the following is not affected by the addition of catalyst? [CPMT-2011]

- 1) Rate of forward reaction
- 2) Rate of backward reaction
- 3) Time required to reach the equilibrium
- 4) Spontaneity

2. Which one of the following is an example for homogenous catalyst?

[KCET-2010]

- 1) Manufacture of Sulphuric acid by Contact process.

- 2) Manufacture of ammonia by Haber's process.
- 3) Hydrolysis of sucrose in the presence of dilute hydrochloric acid.
- 4) Hydrogenation of oil.

**3. Catalytic poisons act by**

[Manipal 2010]

- 1) Making the products chemically inactive
- 2) Increasing the rate of the backward reactions
- 3) Chemical combination with any one of the reactants
- 4) Preferential adsorption on the catalyst surface

**4. Which type of metal form effective catalyst?**

[Haryana PMT 2009]

- |                         |                      |
|-------------------------|----------------------|
| 1) Alkali metal         | 2) Transition metal  |
| 3) Alkaline earth metal | 4) Radioactive metal |

**Key**

- 1) 4      2) 3      3) 4      4) 2

Colloidal State : Distinction between True Solutions, Colloids and Suspensions, Lyophilic, Lyophobic, Multi Molecular, and Macromolecular Colloids

1. Which one of the following is most effective in  $As_2S_3$  causing the coagulation of an sol? [E2009]  
1) KCl                      2)  $AlCl_3$                       3)  $MgSO_4$                       4)  $K_3Fe(CN)_6$
2. Which of the following is not correct? [E 2007]  
1) Milk is a naturally occurring emulsion.  
2) Gold sol is a lyophilic sol.  
3) Physical adsorption decreases with rise in temperature.  
4) Chemical adsorption is unilayered.
3. The dispersed phase, dispersion medium and nature of colloidal solution (lyophilic or lyophobic) of gold 'sol' respectively are (E-2006)  
1) Solid, Solid, Lyophobic  
2) Liquid, Liquid, Lyophobic  
3) Solid, Liquid, Lyophobic  
4) Solid, Liquid, Lyophilic
4. Which of the following is a lyophobic colloidal solution (E -2004)  
1) Aqueous starch solution  
2) Aqueous protein solution  
3) Gold sol  
4) Polymer solution in some organic solvents
5. Which one of the following is a lyophilic colloidal solution (E-2004)  
1) Smoke                                      2) Gold sol  
3) Starch sol                                      4) Cloud
6. Colloidal solution of gold prepared by different methods are of different colours because of (E-2003)

- 1) Variable valency of gold.
  - 2) Different concentration of gold particles.
  - 3) Impurities produced by different methods.
  - 4) Different diameters of colloidal gold particles.
- 7. Which one of the following salts forms a micelle? (E-2001)**
1. Sodium formate
  2. Sodium acetate
  3. Sodium stearate
  4. Sodium chloride
- 8. 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 (A-2008)**
- 1)  $D < A < C < B$  2)  $C < B < D < A$  3)  $A < C < B < D$  4)  $B < D < A < C$
- 9. Which one of the following does not involve coagulation? [KCET-2011]**
- 1) Clotting of blood by the use of ferric chloride
  - 2) Formation of delta region
  - 3) Treatment of drinking water by potash alum
  - 4) Peptisation
- 10. Four different colloids have the following gold number. Which one has its most effective action [AFMC-2009]**
- 1) 10                      2) 30                      3) 20                      4) 40

**KEY**

- 1) 2      2) 2      3) 3      4) 3      5) 3      6) 4      7) 3      8) 4      9) 1