

Single Correct Answer Type

Question 1. Which of the following process does not occur at the interface of phases?

- (a) Crystallisation (b) Heterogeneous catalysis
(c) Homogeneous catalysis (d) Corrosion –

Solution: (c) There is no homogeneous catalysis.

Question 2. At the equilibrium position in the process of adsorption

- (a) $\Delta H > 0$ (b) $\Delta H = T\Delta S$
(c) $\Delta H > T\Delta S$ (d) $\Delta H < T\Delta S$

Solution:

(b) At equilibrium position during adsorption, $\Delta G = \Delta H - T\Delta S = 0$ so that $\Delta H = T\Delta S$.

Question 3. Which of the following interface cannot be obtained?

- (a) Liquid-liquid (b) Solid-liquid
(c) Liquid-gas (d) Gas-gas

Solution: (d) Gas-gas interface cannot be obtained as they are completely miscible in nature.

For example, air is a mixture of various gases such as, O₂, N₂, CO₂, etc.

Question 4. The term 'sorption' stands for

- (a) absorption (b) adsorption
(c) both absorption and adsorption (d) desorption

Solution: (c) Adsorption and absorption when take place together, it is known as sorption.

Question 5. Extent of physisorption of a gas increases with

- (a) increase in temperature
(b) decrease in temperature
(c) decrease in surface area of adsorbent
(d) decrease in strength of van der Waals forces

Solution: (b) Physical adsorption of a gas increases with decrease in temperature because, at higher temperature weak van der Waals forces between gas and the surface become difficult to exist.

Question 6. Extent of adsorption of adsorbate from solution phase increases with

- (a) increase in amount of adsorbate in solution
(b) decrease in surface area of adsorbent
(c) increase in temperature of solution
(d) decrease in amount of adsorbate in solution

Solution: (a) Extent of adsorption of adsorbate from solution phase increases with increase in the amount of adsorbate in the solution. As amount of adsorbate in the solution increases interaction of adsorbent increases which leads to increase in extent of adsorption.

Question 7. Which one of the following is not applicable to the phenomenon of adsorption?

- (a) $\Delta H > 0$
- (b) $\Delta G < 0$
- (c) $\Delta S < 0$
- (d) $\Delta H < 0$

Solution: (a) Adsorption is an exothermic process. So,
 $\Delta H > 0$

Question 8. Which of the following is not a favourable condition for physical adsorption?

- (a) High pressure
- (b) Negative ΔH
- (c) Higher critical temperature of adsorbate
- (d) High temperature

Solution: (d) Physical adsorption is favoured at low temperature.

Question 9. Physical adsorption of a gaseous species may change to chemical adsorption with

- (a) decrease in temperature
- (b) increase in temperature
- (c) increase in surface area of adsorbent
- (d) decrease in surface area of adsorbent

Solution: (b) On increasing temperature physisorption changes to chemisorption. As the temperature increases, energy of activation of adsorbate particles increases which leads to formation of chemical bond between adsorbate and adsorbent. Hence, physisorption transform into chemisorption.

Question 10. In physisorption, adsorbent does not show specificity for any particular gas because

- (a) involved van der Waals forces are universal
- (b) gases involved behave like ideal gases.
- (c) enthalpy of adsorption is low
- (d) it is a reversible process ,

Solution: (a) Physisorption is not specific to any gas since it involves van der Waals forces and no specific bonds are formed.

Question 11. Which of the following is an example of absorption?

- (a) Water on silica gel
- (b) Water on calcium chloride
- (c) Hydrogen on finely divided nickel
- (d) Oxygen on metal surface

Solution: (b) Calcium chloride absorbs water. Other examples show adsorption.

Question 12. On the basis of data given below predict which of the following gases shows least adsorption on a definite amount of charcoal?

Gas	CO ₂	SO ₂	CH ₄	H ₂
Critical temperature (K)	304	630	190	33

- (a) CO₂ (b) SO₂ (c) CH₄ (d) H₂

Solution: (d) The lesser the value of critical temperature of gases the lesser will be the extent of adsorption. Here H₂ has lowest value of critical temperature, i.e., 33. Hence, hydrogen gas shows least adsorption on a definite amount of charcoal.

Question 13. In which of the following reactions heterogeneous catalysis involved?

- (i) $2\text{SO}_2(\text{g}) + \text{O}_2(\text{g}) \rightarrow 2\text{SO}_3(\text{g})$
(ii) $2\text{SO}_2(\text{g}) \rightarrow 2\text{SO}_3(\text{g})$
(iii) $\text{N}_2(\text{g}) + 3\text{H}_2(\text{g}) \rightarrow 2\text{NH}_3(\text{g})$
(iv) $\text{CH}_3\text{COOCH}_3(\text{l}) + \text{H}_2\text{O}(\text{l}) \xrightarrow{\text{HCl}} \text{CH}_3\text{COOH}(\text{aq}) + \text{CH}_3\text{OH}(\text{aq})$

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

Solution: (a) In reaction (ii) and reaction (iii), catalysts are in solid state, and reactants and products are gases.

Question 14. At high concentration of soap in water, soap behaves as

- (a) molecular colloid (b) associated colloid
(c) macromolecular colloid (d) lyophilic colloid .

Solution: (b) At low concentration soap behaves as strong electrolyte but at higher concentration it behaves as colloid due to formation of aggregates called micelles. These are known as associated colloids.

Question 15. Which of the following will show Tyndall effect?

- (a) Aqueous solution of soap below critical micelle concentration.
(b) Aqueous solution of soap above critical micelle concentration.
(c) Aqueous solution of sodium chloride.
(d) Aqueous solution of sugar.

Solution: (b) Aqueous solution of soap above critical micelle concentration leads to the formation of colloidal solution. Tyndall effect is a characteristic of colloidal solution in which colloidal particles show a coloured appearance when sunlight is passes through it and seen perpendicularly.

Question 16. Method by which lyophobic sol can be protected?

- (a) By addition of oppositely charged sol
(b) By addition of an electrolyte
(c) By addition of lyophilic sol
(d) By boiling

Solution: (c) Lyophobic sol can be protected by adding lyophilic sol which is known as protective colloid.

Question 17. Freshly prepared precipitate sometimes gets converted to colloidal solution by

- (a) coagulation (b) electrolysis
(c) diffusion (d) peptisation

Solution: (d) Peptisation is the process of converting freshly prepared precipitate into colloid.

Question 18. Which of the following electrolytes will have maximum coagulating value for AgI/Ag⁺ sol?

- (a) Na₂S (b) Na₃PO₄ (c) Na₂SO₄ (d) NaCl

Solution: (b) According to Hardy-Schulze law, the greater the charge on anion, the greater will be its coagulating power.

Electrolytes	Anionic part	Charge on anion
Na ₂ S	S ²⁻	2
Na ₃ PO ₄	PO ₄ ³⁻	3
Na ₂ SO ₄	SO ₄ ²⁻	2
NaCl	Cl ⁻	1

Here, PO₄³⁻ have highest charge. Hence, PO₄³⁻ have highest coagulating power.

Question 19. A colloidal system having a solid substance as a dispersed phase and a liquid as a dispersion medium is classified as

- (a) solid sol (b) gel (c) emulsion (d) sol

Solution: (d) It is called sol.

Question 20. The values of colligative properties of colloidal solution are of small order in comparison to those shown by true solutions of same concentration because colloidal particles

- (a) exhibit enormous surface area
(b) remain suspended in the dispersion medium
(c) form lyophilic colloids
(d) are comparatively less in number

Solution: (d) Colloidal particles are large in size and less in number.