



CHEMISTRY

BOOKS - MTG GUIDE

SURFACE CHEMISTRY

Illustration

1. Give reasons for the following observations:

NH_3 gas absorbs more readily than N_2 gas on the surface of charcoal.





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2. Give reasons for the following observations:

Why is a finely divided substance more effective as an adsorbent?



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3. The volume of nitrogen gas at $0^{\circ}C$ and 1.013 bar required to cover a sample of silica gel with unimolecular layer is $129\text{cm}^3\text{g}^{-1}$ of gel. Calculate the surface area per gram of the gel if each nitrogen molecule occupies $61.2 \times 10^{-20}\text{m}^2$.



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4. Physisorption is multi-layered, while chemisorption is monolayered. Explain.



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5. Explain how the phenomenon of adsorption find application in the following processes:

Production of vacuum



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6. Explain how the phenomenon of adsorption find application in the following processes:

Heterogeneous catalysis



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7. What are biocatalysts? Give an example.



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8. Give reasons for the following observation : It is necessary to remove CO when ammonia is

prepared by Haber's process.



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9. For the coagulation of 100 mL of arsenious sulphide solution , 5mL of 1 M NaCl is required.

What is the coagulating power of NaCl?



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10. The coagulation of 100 mL of a colloidal solution of gold is completely prevented by adding 0.25 g of starch to it before adding 10mL

of 10% NaCl solution. Find out the gold number of starch .



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11. Give reasons for the following:

Brownian movement provides stability to the colloidal solution



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12. Give reasons for the following:

True solution does not show Tyndall effect.



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13. Same substances can act both as colloids and crystalloids. Explain.



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14. What will be the charge on AgI colloidal particles when it is prepared by adding small amount of $AgNO_3$ solution to KI solution in water? What is responsible for the development of this charge?



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Neet Cafe Topicwise Practice Questions

1. Separation of colloidal particles from those of molecular dimension with electricity is known as

- A. electrolysis
- B. electrophoresis
- C. electro dialysis
- D. none of these

Answer: C



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2. Smoke is an example of

- A. gas dispersed in liquid
- B. gas dispersed in solid
- C. solid dispersed in gas
- D. solid dispersed in solid.

Answer: C



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3. The Brownian motion is due to

A. temperature fluctuation within the liquid phase

B. attraction and repulsion between charges on the colloidal particles

C. impact of molecules of the dispersion medium on the colloidal particles

D. none of these

Answer: C



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4. Which of the following is not a property of hydrophilic sols?

- A. High concentration of dispersed phase can be easily attained.
- B. Coagulation is reversible.
- C. Viscosity and surface tension are nearly same as that of water.

D. The charge of the particle depends on the pH value of the medium, it may be positive, negative or even zero.

Answer: C



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5. On adding few drops of dil. HCl to freshly precipitated ferric hydroxide, a red coloured colloidal solution is obtained. This phenomenon is known as

A. peptisation

B. dialysis

C. protective action

D. dissolution

Answer: A



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6. Which of the following is a hydrophilic colloidal sol?

A. Barium sulphate sol

B. Arsenious sulphide sol

C. Starch sol

D. Silver iodide sol

Answer: C



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7. The stability of lyophilic colloid is due to

A. charge on their particles

B. large size of their particles

C. small size of their particles

D. a layer of dispersion medium.

Answer: D



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8. Tyndall effect is more pronounced in

A. hydrophilic sols

B. hydrophobic sols

C. lyophilic sols

D. both (a) and C

Answer: B



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9. Which of the following is an associated colloid?

A. Protein + water

B. Soap + water

C. Rubber + benzene

D. Milk

Answer: B



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10. The CMC of a given soap in water is 10^{-3} mol litre $^{-1}$. A 10^{-4} mol litre $^{-1}$ solution of this soap in water is a

- A. lyophilic sol
- B. lyophobic sol
- C. true solution
- D. none of these.

Answer: C



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11. An example of water in oil type emulsion is

A. milk

B. butter

C. gelatin

D. d) both (b) and (c).

Answer: B



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12. Which one of the following is correctly matched?

A. Emulsion-curd

B. Foam-mist

C. Aerosol-smoke

D. Solid sol-cake

Answer: C



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13. Which of the following methods is used for the destruction of sol?

A. Condensation

B. Dialysis

C. Diffusion through animal membrane

D. Addition of an electrolyte

Answer: D



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14. Colloidal solution are not purified by

A. dialysis

B. electro dialysis

C. ultrafiltration

D. electrophoresis

Answer: D



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15. Surface tension of lyophilic sols is

A. lower than that of H_2O

B. more than that of H_2O

C. equal to that of H_2O

D. none of these.

Answer: A



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16. Addition of lyophilic solution to the emulsion,
forms

A. a protective film around the dispersed phase

B. a protective film around the dispersion medium

C. an aerosol

D. true solution.

Answer: A



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17. Micelles are

A. emulsion cum gel

B. associated colloids

C. adsorbed catalysts

D. ideal solutions.

Answer: B



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18. The isoelectric point of a colloiddally dispersed material is the pH value at which

- A. the dispersed phase migrate in an electric field
- B. the dispersed phase does not migrate in an electric field
- C. the dispersed phase has pH equal to 7
- D. the dispersed phase has pH equal to zero.

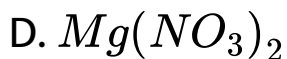
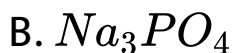
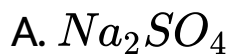
Answer: B



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19. The arsenious solution is negatively charged.

The maximum power of precipitating it, is in



Answer: C



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20. Which of the following statements is correct for Tyndall effect?

A. Scattering and polarizing of light by small suspended particles is called Tyndall effect.

B. Tyndall effect of colloidal particles is due to dispersion of light.

C. Tyndall effect is due to refraction of light

D. Tyndall effect is zig-zag motion of suspended particles.

Answer: A



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21. The coagulating power of an effective ion carrying the charge opposite to the sol particles is given by

- A. Brownian movement
- B. Gold number
- C. Tyndall effect
- D. Hardy-Schulze rule.

Answer: D



22. Point out the false statement.

- A. Brownian movement and Tyndall effect are shown by colloidal systems.
- B. Gold number is a measure of the protective power of a lyophilic colloid.
- C. The colloidal solution of a liquid in liquid is called gel.

D. Hardy-Schulze rule is related with coagulation.

Answer: C



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23. Micelles may be formed by aggregates of soap anions in water as the anions are

A. hydrophilic

B. hydrophobic

C. diphilic (one hydrophilic head being attached to a long hydrophobic tail)

D. carriers of electricity

Answer: C



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24. The dispersed phase in colloidal iron (III) hydroxide and colloidal gold is positively and negatively charged respectively. Which of the following statements is not correct?

- A. Mixing the sols has no effect.
- B. Coagulation in both sols can be brought about by electrophoresis.
- C. Magnesium chloride solution coagulates the gold sol more readily than the iron (III) hydroxide sol.
- D. Sodium sulphate solution cause coagulation in both sols.

Answer: A



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25. The volume of a colloidal particle, V_c as compared to volume of solute particle V_s , in a true solution could be

A. $\frac{V_c}{V_s} \approx 10^{-3}$

B. $\frac{V_c}{V_s} \approx 10^3$

C. $\frac{V_c}{V_s} \approx 1$

D. $\frac{V_c}{V_s} \approx 10^{23}$

Answer: B



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26. When river water meets sea water delta formation takes place. This is due to the phenomenon of

A. electrophoresis

B. dialysis

C. coagulation

D. adsorption

Answer: C



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27. Which of the following has highest protective power on lyophobic colloids?

- A. Gum arabic
- B. Sodium oleate
- C. Starch
- D. Gelatin

Answer: D



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28. Match the Column I with Column II and select the correct option.

Column I	Column II
A. Coagulation	1. Scattering
B. Lyophilization	2. Washing of precipitates
C. Peptization	3. Purification of colloids
D. Tyndall effect	4. Electrolyte

A. A-4, B-3, C-2, D-1

B. A-2, B-1, C-3, D-4

C. A-3, B-1, C-2, D-4

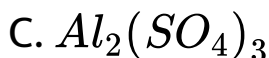
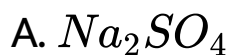
D. A-4, B-3, C-1, D-2

Answer: A



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29. Among the electrolytes Na_2SO_4 , $CaCl_2$, $Al_2(SO_4)_3$ and NH_4Cl , the most effective coagulating agent for Sb_2S_3 sol is



Answer: C



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30. The size of particles, in suspension, true solution and colloidal solution, varies in the order

A. true solution > suspension > colloidal

B. suspension > true solution < colloidal

C. suspension > colloidal > true solution

D. true solution > colloidal > suspension.

Answer: C



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31. Cheese is an example of

A. liquid dispersed in solid

B. solid dispersed in gas

C. solid dispersed in liquid

D. liquid dispersed in gas

Answer: A



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32. Colloidal solution found effective in medicines

is

- A. colloidal gold
- B. colloidal sulphur
- C. colloidal antimony
- D. all of these.

Answer: D



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33. Soap removes grease by

- A. adsorption

B. emulsification

C. coagulation

D. none of these

Answer: B



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34. The turbidity of a polymer solution measures the

A. light absorbed by the solution

B. light transmitted by the solution

C. light scattered by the solution

D. all of these

Answer: C



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35. Bredig's are method cannot be used to prepare colloidal solution of which of the following?

A. Pt

B. Fe

C. Ag

D. Au

Answer: B



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36. Which one is true statement?

A. Arsenious oxide is basic oxide

B. Arsenious sulphide is positively charged in colloidal solution.

C. Arsenious sulphide is negatively charged in colloidal solution.

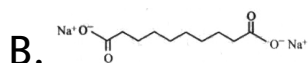
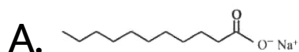
D. Ferric hydroxide is negative sol.

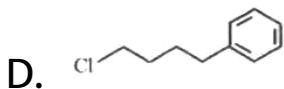
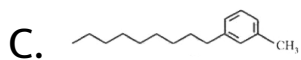
Answer: C



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37. Which of the following molecules is most suitable to disperse benzene in water?





Answer: C



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Check Your Neet Vitals

1. Which one of the following is not a property of hydrophilic sols?

- A. High concentration of dispersed phase can be easily attained
- B. Coagulation is reversible.
- C. Viscosity and surface tension are about the same as for water.
- D. None of these

Answer: C



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2. Ferric chloride is applied to stop bleeding because

A. Fe^{3+} ions coagulate negatively charged blood solution

B. Fe^{3+} ions coagulate positively charged blood solution

C. Cl^{-} ions coagulate positively charged blood solution

D. Cl^{-} ions coagulate negatively charged blood solution.

Answer: A



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3. Potassium stearate is obtained by saponification of an oil or fat. It has the formula,

$CH_3(CH_2)_{16}COO^-K^+$ The molecule has a hydrophobic end $(CH_3(CH_2)_{16}-)$ and a hydrophilic end (COO^-K^+) . Potassium

stearate is an example of

A. lyophobic colloid

B. multimolecular colloid

C. macromolecular colloid

D. associated colloid or micelle

Answer: D



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4. Shape selective catalysts are so called because of

A. the shape of the catalyst

B. the specificity of the catalyst

C. the size of the pores of catalyst which can trap selective molecules only

D. their use for some selected reactions only.

Answer: C



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5. Select the correct statement

A. Surface active agents like soaps and synthetic detergents are micelles.

B. Soaps are emulsifying agents

C. Both

$C_{17}H_{35}$ – (hydrocarbon part) and $-COO^-$

(carboxylate part) of stearate ion

$(C_{17}H_{35}COO^-)$ are hydrophobic.

D. Both (a) and (b).

Answer: D



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6. Coagulation or demulsification can be done by some of the methods given below:

I. By addition of a substance which would destroy the emulsifier.

II. By addition of an electrolyte which would destroy the charge.

III. By heating, freezing and centrifuging.

Select the correct methods.

A. Only I and II

B. I, II and III

C. Only II

D. Only III

Answer: B



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7. White of an egg whipped with water acts as

A. macromolecular colloid

B. associated colloid

C. molecular colloid

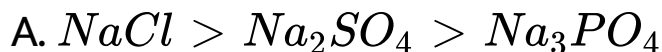
D. normal electrolytic solution

Answer: A



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8. Under the influence of an electric field, the particles in a sol migrate towards cathode. The coagulation of the same sol is studied using $NaCl$, Na_2SO_4 and Na_3PO_4 solutions. Their coagulation values will be in the order :





Answer: A



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9. 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. $A < C < B < D$

B. $B < D < A < C$

C. $D < A < C < B$

$$D. C < B < D < A$$

Answer: A



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10. In which of the following manner the adsorption of a gas on a solid surface varies with pressure of the gas?

A. Fast \rightarrow slow \rightarrow independent of the pressure

B. Slow → fast → independent of the
pressure

C. Independent of the pressure → fast →
slow

D. Independent of the pressure → slow →
fast

Answer: A



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11. Milk is an emulsion in which

- A. a gas is dispersed in water
- B. a solid is dispersed in water
- C. fat is dispersed in water
- D. lactose is dispersed in water.

Answer: C



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12. Match the entries of Column I with appropriate entries of Column II and select the

correct option.

Column I	Column II
P. Enzymes	1. Multimolecular colloid
Q. Gold sol	2. Macromolecular colloid
R. Cellulose nitrate shaken with ethanol	3. Associated colloid
S. Detergent dissolved in water	4. Collodion

A. P-1, Q-2, R-3, S-4

B. P-2, Q-3, R-4, S-1

C. P-2, Q-1, R-4, S-3

D. P-3, Q-2, R-1, S-4

Answer: C



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13. What is the value of $1/n$, in Freundlich adsorption isotherm?

- A. Between 2 and 4 in all cases
- B. Between 0 and 1 in all cases
- C. 1 in case of chemisorption
- D. 1 in case of physical adsorption

Answer: B



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14. When the concentration of an adsorbate is higher on the surface of adsorbent than in the adjoining bulk, the phenomenon is called

- A. chemisorption
- B. physisorption
- C. positive adsorption
- D. negative adsorption

Answer: C



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15. Which one of the following is wrong about physical adsorption?

- A. It involves only van der Waals' forces of attraction
- B. It has low heat of adsorption
- C. It is reversible in nature
- D. It forms a unimolecular layer on the surface of the adsorbent.

Answer: D



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16. According to adsorption theory of catalysis, the speed of the reaction increases because

A. the concentration of the reactant molecules at the active centres of the catalyst becomes high due to adsorption

B. in the process of adsorption, the activation energy of the molecules becomes large

C. adsorption produces heat which increases the speed of the reaction

D. adsorption lowers the activation energy of
the reaction

Answer: D



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17. Which one of the following is an example for homogeneous catalysis?

A. Manufacture of ammonia by Haber's
process

B. Manufacture of sulphuric acid by contact process

C. Hydrogenation of oil

D. Hydrolysis of sucrose in presence of dilute hydrochloric acid

Answer: D



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18. Addition of lyophilic sols, to lyophobic colloid, forms

A. a protective film around the dispersed phase

B. a protective film around the dispersion medium

C. an aerosol

D. true solution

Answer: A



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19. Bleeding is stopped by the application of ferric chloride. This is because

A. the blood starts flowing in the opposite direction

B. the blood reacts and a solid is formed which seals the blood vessel

C. the blood is coagulated and the blood vessels are sealed

D. the ferric chloride seals the blood vessel.

Answer: C



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20. According to Langmuir adsorption isotherm the amount of gas adsorbed at very high pressure

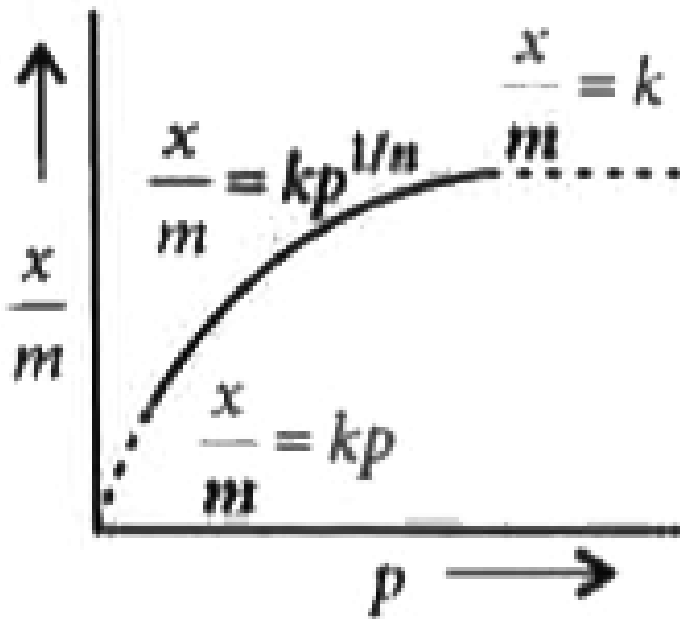
- A. reaches a constant limiting value
- B. goes on increasing with pressure
- C. goes on decreasing with pressure
- D. increases first and decreases later with pressure

Answer: A



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21. Which one is not correct about Freundlich isotherm?



A. $n = \frac{1}{\tan \theta}$ at average pressure

B. $\theta = 45^\circ$ at low pressure

C. $\theta = 45^\circ$ at high pressure

D. None of these

Answer: C



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22. The colour of the colloidal particles of gold obtained by different methods differ because of

A. variable valency of gold

B. different concentration of gold particles

C. different types of impurities

D. different diameters of colloidal particles.

Answer: D



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23. Which of the following is less than zero during adsorption?

A. ΔG

B. ΔS

C. ΔH

D. All of these .

Answer: D



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24. Plot of $\log \frac{x}{m}$ against $\log p$ is a straight line inclined at an angle of 45° . When the pressure is 0.5 atm and Freundlich parameter, k is 10, the amount of solute adsorbed per gram of adsorbent will be ($\log 5 = 0.6990$)

A. 1g

B. 2g

C. 3g

D. 5g

Answer: D



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25. Which one is incorrect about positive catalyst or negative catalyst?

- A. Positive catalyst lowers the energy of activation
- B. Negative catalyst increases the energy of activation
- C. Positive catalyst increases the rate of reaction
- D. Negative catalyst functions to remove active intermediates.

Answer: B



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1. If x is amount of adsorbate and m is amount of adsorbent, which of the following relations is not related to adsorption process?

A. $x/m = f(p)$ at constant T

B. $x/m = f(T)$ at constant p

C. $p = f(T)$ at constant (x/m)

D. $\frac{x}{m} = p \times T$

Answer: D



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2. In Freundlich adsorption isotherm, the value of $1/n$ is

- A. between 0 and 1 in all cases
- B. between 2 and 4 in all cases
- C. 1 in case of physical absorption
- D. 1 in case of chemisorption.

Answer: A



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3. The protecting power of lyophilic colloidal sol is expressed in terms of

- A. coagulation value
- B. gold number
- C. critical micelle concentration
- D. oxidation number.

Answer: B



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4. Which one of the following statements is incorrect about enzyme catalysis?

- A. Enzymes are mostly proteinous in nature
- B. Enzyme action is specific
- C. Enzymes are denatured by ultraviolet rays and at high temperature
- D. Enzymes are least reactive at optimum temperature.

Answer: D



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5. Which property of colloids is not dependent on the charge on colloidal particles?

- A. Coagulation
- B. Electrophoresis
- C. Electro-osmosis
- D. Tyndall effect

Answer: D



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6. Fog is a colloidal solution of

A. solid in gas

B. gas in gas

C. liquid in gas

D. gas in liquid

Answer: C



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7. Which one of the following characteristics is associated with adsorption?

A. ΔG and ΔH are negative but ΔS is positive.

B. ΔG and ΔS are negative but ΔH is positive.

C. ΔG is negative but ΔH and ΔS are positive.

D. ΔG , ΔH and ΔS all are negative.

Answer: D



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8. The coagulation values in millimoles per litre of the electrolytes used for the coagulation of As_2S_3 are given below :

I. (NaCl) - 52,

II. ($BaCl_2$) = 0.69,

III. ($MgSO_4$) = 0.22

The correct order of their coagulating power is

A. $I > II > III$

B. $II > I > III$

C. $III > II > I$

D. $III > I > II$

Answer: C



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9. Which one of the following statements is not correct?

A. The value of equilibrium constant is changed in the presence of a catalyst in the reaction at equilibrium.

B. Enzymes catalyse mainly bio-chemical reactions.

C. Coenzymes increase the catalytic activity of enzyme.

D. Catalyst does not initiate any reaction.

Answer: A



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10. On which of the following properties does the coagulating power of an ion depend?

- A. The magnitude of the charge on the ion alone.
- B. Size of the ion alone.
- C. Both magnitude and sign of the charge on the ion.
- D. The sign of charge on the ion alone.

Answer: C



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11. Which mixture of the solutions will lead to the formation of negatively charged colloidal $[AgI]I^-$ sol?

- A. 50 mL of 0.1 M $AgNO_3$ + 50 mL of 0.1 M KI
- B. 50 mL of 1 M $AgNO_3$ + 50 mL of 1.5 M KI
- C. 50 mL of 1 M $AgNO_3$ + 50 mL of 2 M KI
- D. 50 mL of 2 M $AgNO_3$ + 50 mL of 1.5 M KI

Answer: B



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