CHEMISTRY

BOOKS - PRADEEP CHEMISTRY (HINGLISH)

SURFACE CHEMISTRY

Sample Problem

1. 50 ml of 1 M oxalic acid (mol. wt. = 126) is shaken with 0.5 g of wood charcoal. The final

concentration of soultion after adsorption is 0.5 M. Calculate the amount of oxalic acid adsorbed

per gram of charcoal.

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2. During the adsorption of acetic acid vapours on the vapours on the surface of 1 g of animal charcoal, the following observations were recorded where x represents mass of acetic acied vapour adsorbed

	Observation I	Observation II
x (g)	0·726	0·438
P (atm)	0·576	0·210

Calculate the values of the constants n and k of Freundlich adsorption isiotherm.

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3. Applying Freundlich adsorptin isotherm, calculate the amount of acetic acid adsorbed by 1 kg of blood charcoal at $25^{\circ}C$ from a 5% vinegar solution (mass/volume). Given that if the concentration is expressed in molarity (mol dm^{-3}), x/m is mass of the solute adsorbed per gram of adsorbent, then $k = 0.160$ and $n = 2.32$.

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Curiosity Question

1. What is done to reduce pollutionn by carbon monoxide or nitric oxide etc. formed furing combustion of fuels in automobiles ?

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2. Why food in our body is digested so fast ?

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3. Why some patients have to undergo dialysis ? How does it help ?

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4. Why do we see a beam coming from projector to screen in a cinema hall ?

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5. Vanishinhg cream and cold cream both are emulsions. Them what is the difference between the two ?

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Problem For Practice

1. $50mL$ of standard gold solution needs $0.05mg$ of gelatin for its protection from coagulation. Calculate the gold number of gelatine?

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Advanced Problems For Competitions

1. Calculate how long a hydrogen atom will remain on the surface of a solid at 298 K if its desorption activatino energy is (a) $15kJmol^{-1}$ (b) 150

kJ mol^{-1}. Assume that $\tau_0 = 10^{-13}$ s. Also calculate the results at 1000 K. What do you conclude from your results ?

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2. The time for which the oxygen atom remains adsorbed on a tungsten surface is 0.36 s at 2550 K and 3.49 s at 2360 K. Calculate the activation energy of desorption of oxygen atom. Assumign that the oxygen atom is tight chemisorbed, calculate per-exponential factor τ_0 in the Arrhenius type equation.

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3. The following data were obtained for the adsorption of CO on 3 g of charcoal at $0^\circ C$

`Pressuer (mm) : 180 540

Volume of gas absorbed in cc raduced to STP : 16.5 38.1

Calculate the values of the constants k and n used in Freundlich equation.

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4. The following data were obtained for the adsorption of carbon monoxide gas on 3.022 g of charcoal at $0^{\circ}C$ and 1 atm pressure. Verify that the data obey the Langmuir monolyer adsorption isotherm. Also calculate the constant K and the volume (v) corresponding to complete surface coverege

$P(\text{toor}):$	100	200	300	400	500	600
$v\left(cm^3\right):$	10.2	18.6	25.5	31.4	36.9	41.6

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5. Assuming that van't Hoff type equation can be used to determine the temperature dependence of the amount of the gas adsorbed on the surface of a solid, calculate the enethalpy of adsorption, ΔH_{ads} for N_2 at 1 atm. Given that $155cm^3$ of the gas measured at STP is adsorbed by 1 g of charcoal at 88 K and $15cm^3$ at 273 K.

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6. Twenty precent of the surface sites of a catalyst is occupied by nitrogen molecules. The density of surface sites is $6.023 \times 10^{14} cm^{-2}$. The total sarface area is $1000 cm^2$. The catalyst is is henced to $300 K$ and nitrogen is completely desorbed a pressure of 0.001 atm and volume of $2.46 cm^3$. Calculate the number of sites occupied by niitrogen molecules.

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7. One gram of a water insoluble substance of density $0.8 g cm^{-3}$ is dispersed in 1 L of water forming a colloidal solution having 10^{13} particles of spherical shape per mm^3. Calculate the radius of the particle.

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8. What is the surface area of a cube having an edge length of 1 cm? What would be the total surface area of the same material if it were subdivided into colloidal size cubes each having an edge length of 10^{-7} cm ?

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9. A particle of suspension of radius 1 mm is broken to form colloidal particles of radius 1000Å. How many times will be the total surface area the colloidal particles as compared to the surface area of the particle of suspension.

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10. The density of gold is $19g/cm^3$. If 1.9×10^{-4}g of gold is dispersed in one litre of water to give a sol having spherical gold particles of radius 10 nm then the number of gold particles per mm^3 of the sol will be:

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11. In a coagulation experiment, $5mL$ of As_2S_3 is mixed with distilled water and $0.1M$ solution of an electrolyte AB so that the total volume is $10mL$. It was found that all solutions sontianing more than $4.6mL$. Of

AB coagulate within 5 min. What is the flocculation value of AB for As_2S_3 solution?

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12. Emulsification of 10 ml of oil in water produces 2.4×10^{18} droplets. If the surface tension at the oil-water interface is $0.03Jm^{-2}$ and the area of each droplet is $12.5 \times 10^{-16}m^2$, the energy spent in the formation of oil droplets is -

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Test Your Grip Multiple Choice Questions

1. Which of the following is true in respect of chemical adsorption?

A. $\Delta G < 0, \Delta S > 0, \Delta H < 0$

B. $\Delta G < 0, \Delta S < 0, \Delta H < 0$

C. $\Delta G > 0, \Delta S > 0, \Delta H < 0$

D. $\Delta G < 0, \Delta S < 0, \Delta H > 0$

Answer: A

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2. The most adsorbed gas on activated chrocal is

A. N_2

B. H_2

C. CO_2

D. CH_4

Answer: C

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3. Which of the following statements is incorrect regarding physiosorptions ?

A. It occurs because of van Walls forces

B. More easily liquefiable gases are adsorbed readily

C. Underhigh pressure, it resulting into multimolecular layer on adsorbent surface

D. Enthalpy of adsorption $(\Delta H_{\text{adsorption}})$ is low and positive

Answer: D

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4. The chemical formula of Zeigler-Natta catalyst is

A. $CuCl_2$

B. $NiCl_2$

C. $CrCl_3$

D. $TiCl_4$

Answer: D

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5. Colloidal solution

A. True solution

B. Suspension

C. Heterogenous solution

D. Homogeneous solution

Answer: C

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6. Which one of the following from an internisic colloid ?

A. Sulphur

B. As_2S_3

C. $Fe(OH)_3$

D. Egg albumin

Answer: D

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7. which one of the following is lyophilic colloid ?

A. Milk

B. Gum

C. Fog

D. Blood

Answer: B

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8. Positively charged colloidal solution is

A. SnO_2

B. As_2S_3

C. gum

D. none of these

Answer: A

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9. Which of the following is correct for lyophilic sol ?

A. They are irreversible.

B. They are formed by inorganic substances.

C. They are radily coagulated by addidion of electrolytes.

D. They are self-stabilized.

Answer: D

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10. Purple of cassius is a colloidal sol of

A. silver

B. platium

C. gold

D. iron

Answer: C

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11. Which of the following electrolytes will be most effective in the coagulation of gold sol :

A. $NaNO_3$

B. $K_4\left[Fe(CN)_6\right]$

C. Na_3PO_4

D. $NgCl_2$.

Answer: D

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12. The function of gum arabic in the preparation of Indian ink is

A. Coagulation

B. Peptization

C. Protective action

D. Adsorption.

Answer: C

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13. Addition of ferric chloride solution to ferric hydroxide precipitate results in

A. Peptization

B. Protection

C. Flocculation

D. Dialysis

Answer: A

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14. The emulsifying agent present in milk that makes it stable is

A. lactose

B. maltose

C. casein

D. lactic lactic bacilli

Answer: C

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Fill In The Blanks

1. The adsorption of gases on the surface of metals is called .....

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2. Silca gel placed in water vapour results in ..... whereas calcium chloride placed in water vapour results in .....

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3. If solvent is adsorbed from a solutin on the adsorbent, it is called ..... Adsorption.

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4. If both adsorption and absorption take place simulataneously, the process is called .....

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5. Adsorption of a gas on the surface of a solid adsorbent is ..... (exothermic or endothermic or neither exothermic nor endothemic).

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6. Increasing the adsorbing power iof an adsorbent by suddividing it is called ..... of the solid adsorbent.

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7. The nature of foces involved in physical adsorption are .....

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8. The heat of adsorption physisorption lies in the range .....$kJmol^{-1}$

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9. Adsorption of N_2 gas on iron at 83 K is ..... Whereas at 773 K, it is ..... (fill in the type of adsorption).

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10. A plot of mass of the gas adsorbed per gram of the adsorbent varsus pressure at constant temperature is called.....

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11. In plot of mass of the gas adsorbed per gram of the adsorbent versus temperature at constant pressure is called .....

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12. In Freundlich adsorption isoteerm, in the plot of log $\frac{x}{n}$ versus log P, if 'a' is the slope of the line and 'b' is th intercfept on the log (x/m) axis, then constant k=..... and n= .....

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13. The techinque of separation of the components of a mixture in the solution based on their differential adsorption is called .....

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14. The catalysts which increase the rate of reaction are called..... Catalysts.

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15. In Fischer-Tropsch process for production of hydrocabons from CO and H_2, the catalyst used is.....

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16. The catalyst $TiCl_4 + R_3Al$ used in the polymerisation of ethylene is known as .....catalyst.

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17. The full name of the catalyst ZSM-5 used in petroleum industry for getting a mixture of hydrocarbons by dehydration of alcohols is.....

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18. The optium temoperature range for enzymatic activity is .....and optimum pH range is .....

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19. The size of the collodial particles lies in the range.....nm.

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20. Colloidal dispersion of a liquid in a gas is called.....

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21. Colloidal sols which can be prepared ddirectly by micing a substance with the dispersiion medium are called.....

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22. The type of colloidal dispresino obtained when egg protein is mixed with water is called .....(multimolecular or macromolecular or associated colloid).

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23. The formation of micelles takes place above a particular temperature called.....

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24. The formation of micelles takes place above a particular concentration called.....

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25. The colloidal sol of cellulose nitrate in ethyl alcohol is called.....

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26. Converting a freshly precipitated substance into colloidal state by shaking with suitable electrolyte is called.....

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27. The process of separating the crystalloids from collodis using an animal membrane is called.....

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28. The zig-zag movement of the collodal particles in a collodidal sol is called.....

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29. Scattering of light by colloidal particles is called.....

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30. The movement of colloidal particles under the influence of an electric field is called.....

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31. The movement of the molecules of the dispersion medium under the influence of an electric field and not allowing the colloidal particles to

move is called.....

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32. The minimum millimoles of the electrolyte of the electrolyte that must be added to one litre of a colloidal sol so as to bring about its complete coagulation is called its.....

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33. The minimum milligrams of a protective colloid to be added to 10 mL red gold sol so that no coagulation takes place when 1 mL of 10% NaCl solution is rapidly added to it is called its.....

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34. The colloiidal dispresion of a liquid in another liquid is called.....and the substance added to stabilized it is called.....

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35. Vanishing cream is an example of .....in.....type of emulsion whereas cold cream is an example of .....in.....type of emulsion.

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36. The colloidal system consisting of liquid as the dispersed phase and solid as the dispersion medium is called.....

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37. The swelling of a gel in water is called.....

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38. The gel-sol transformation on mechanical shaking and allowing to stand is called.....

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Conceptual Questions

1. What is the difference when a concentrated solution of KCl is shaken with blood charcoal in one case and a dilute solution of KCl in the second case ?

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2. In which of the following does adsorption take place and why?

(i) Silica gel placed in the atmosphere saturated with water

(ii) Anhyd. $CaCl_2$ place in the atmosphere saturated with water.

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3. How is adsorption of a gas related to its critical temperature ?

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4. Adsorption of a gas on the surface of solid is sgenerally accompanied by decrease in entropy but still it is spontaneous in naturre. Explain.

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5. Which will be adsorbed more readily on the surface of charcoal and why– NH_3 or CO_2?

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6. How do size of particles of adsorbent, pressure of gas and prevailling temperature influence the extent of adsorption of a gas on a solid ?

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7. How can the constants k and n of the freundlich adsorption equation be calculated ?

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8. What from Freundich adsorption isotherm equation will take at high pressures ?

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9. In the case of chemisorption, why adsorption first increases and then decreases with temperature?

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10. Why is silica gel used as a dehumidizer?

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11. What type of building blocks are present in the structure of zeolites? What is this structure called? ,

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12. Name tow physical quantities that remain unaffected when a reversible reaction is carried out in the presence of a catalyst.

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13. What is the effect of catalyst on:

(i) Gibbs energy (ΔG) and

(ii) activation energy of a rection ?

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14. What is the difference in the nature of a dilute soap solution and a concentration soap solution ?

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15. What is the difference between a colloidal solution, gel, and emulsion?

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16. Why lyophilic colloidal sols are more stable than lyophobic collodial sols ?

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17. What type of colloidal sols are formed in the following:

a. Sulphur vapours are passed through cooled water.

b. White of an egg is mixed with water.

c. Soap solution.

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18. What is common in aqua sols and solid aerosol? How do they differ?

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19. What happens when persistent dialysis of colloidal solution is carried out?

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20. Frequently, preparation of a colloid such as a protein can be made more stable if the colloid is dialyzed. Why is this so ?

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21. What causes Brownian movement in a colloidal solution?

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22. Colloidal solution show Tyndall effect. Give two resasons.

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23. How can a colloidal solution and true solution of the same collour be distiguished from each other ?

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24. Why is a collodial sol stable ?

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25. What happens when a colloidal sol of $Fe(OH)_3$ is mixed with that of As_2S_3 ?

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26. A colloidal solution of AgI is prepared by two diffenent methods as ahown in the Fig:

(i) What is the charge on AgI colloidal particles in the two tubes (A) and (B) ?

(ii) Give reason for the origin of charge

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27. Which one of the following electrolytes is most effective for the coagulation of $Fe(OH)_3 sol$ and why?

$NaCl, Na_2SO_4, Na_3PO_4$

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28. Out of $BaCl_2$ and KCl, which is more effective in causing coagulation of a negatively charged colloidal sol ? Give reason.

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29. What will happen if gelatin is added to a goal sol ?

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30. What is the significance of reciprocal of "gold number"?

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31. Give specific term to show the effect of the following processes:

(a) Ferric hydroxide is mixed with arsenic sulphide sol

(b) Ferric chloride solution is mixed with freshly prepared precipitate of ferric hydroxide

(c) H_2S gas is passed throgh arsenic oxide solution

(d) A beam of ligh is passed through arsenic oxide solution.

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32. Match the paris (choose the correct answer from Section B for Section A) :

section A	section B
(a)Gold sol	(i)Hardy-Schulze rule
(b)Gold No.	(ii)van dar Wall force
(c)Coagulation power	(iii)Electorchemical phenomenon
(d)Physical adsorption	(iv)Lyophilic colloid
(e)Corrosion	(v)Lyophobic colloid
	(iv)Tyndall effect

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33. The conductance of an emulsion increases on adding common salt. What type of emulsion is this?

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34. Gelatin is generally added to ice creams. Why?

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35. Why artificial rain can be caused by throwing common salt on the clouds ?

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36. Why is ferric chloride preferred over potassium chloride in case of a cut leading to bleeding?

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37. (I)Explain what is observed when

(a) an emulsion is subjected to centrifugation

(b) direct current is passed through a colloidal sol

(ii) Write a chemical equation showing the preparation of a positive sol.

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38. Give reasons for the following :

(i) Peptizing agent is added to convert a precipitate into a colloidal solution.

(ii) Colloidal gold is used for intramuscular injection.

(iii) Cottrell's smoke precipitator is fitted at the mouth of a chimeny used in factories.

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39. (i)Why does leather get hardened after tanning ?

(ii) On the basis of Hardy-Schulze rule explain why coagulating power of phosphate is higher than chloride.

(iii) Do the vital functions of the body such as digestion get affected furing fever ? Explain your answer.

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Ncert Questions And Exercise With Answers

1. Why are substance like platinum and palladium oftern used for carrying out the electrolysis of aqueous solutions ?

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2. Why dows physisoption decrease with increase of temperature ?

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3. Why are powdered substances more effective adsorbent than their crystalline forms ?

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4. Why is it necessary to remove CO when ammonia is obtained by Haber's process ?

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5. Why is ester hydrolysis slow in the beginning and becomes faster after some time?

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6. What is the role of desorption in the process of catalysis?

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7. What modification can you suggest in the Hardy Schulze law?

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8. Why is it essential to wash the precipitate with water before estimating it quantitatively?

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Ncert Exercises

1. Distinguish between the meaning of the terms adsorption and absorption. Given one example of each.

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2. What is the difference between physisorption and chemisorption ?

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3. Give reason why a finely divided substance is more effective as an adsorbents?

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4. What are the factors which influence the adsorption of a gas on a solid ?

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5. What is an adsorption isotherm? Describe Freundlich adsorption isotherm.

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6. What do you understend by activation of adsorbent? How is it achieved ?

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7. What role does adsorption play in heterogeneous catalysis ?

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8. Why is adsorption always exothermic ?

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9. How are the colloidal solutions classified on the the basis of physical states of the dispersed phase and dispersion medium ?

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10. Disuss the effect of pressure and temperature on the adsorption of gases on solides.

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11. What are lyophilic and lyophobic sols?Give one example of each type ? Why is hydrophobic sol easily coagulated ?

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12. What is the difference between multimolecular and macromolecular collids ? Give one example of each . How are associated colloids different from these two types of colloids ?

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13. What are enzymes ? Write in brief the mechanism of enzyme catalysis ?

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14. How are colloid classified on the basis of: ltbtgt (a) physical state of components

(b) nature of dispersion medium

(c) interaction between dispersed phase and dispersion medium ?

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15. Explain what is observed

(i) when a beam of light is passed through a colloidal sol.

(ii) an electrolyte, NaCI is added to hydrated ferric oxide sol.

(iii) electric current is passed through a colloidal sol.

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16. What are emulsions ? What are their different types ? Give an example of each type ?

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17. What is demulsification ? Name two demulsifiers.

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18. Action of soap is due to emulsification and micelle formation. Comment.

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19. Give four examples of heterogeneous catalysis.

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20. What do you mean by activity and selectivity of catalysts ?

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21. Describe some features of catalysis by zeolites.

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22. What is shape – selective catalysis ?

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23. Explain the following terms :

$a.\ Eletrophoresis$ $b.\ Coagation$

$c.\ Dialysis$ $d.\ Tyndalleffect$

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24. Give four uses of emulsion.

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25. What are micelles ? Give an example of a micelle system.

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26. Explain the following terms with suitable examples (i) Alcosol (ii) Aersol and (iii) Hydrosol

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27. Comment on the statement that colloid is not a substance but state of a substance

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

A. carystallisation

B. heterogenous catalysis

C. homogeneous catalysis

D. corrosion

Answer: C

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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. $\Delta H < T\Delta S$

Answer: B

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3. Which of the following interface cannot be obtained?

A. liquid-liquid

B. solid-liquid

C. liquid-gas

D. gas-gas

Answer: D

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4. The term sorption stands for.....

A. absorption

B. adsorption

C. both absorption and adsorption

D. desorption

Answer: C

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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

Answer: B

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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 temperatuer of solution

D. decrease in amount of adsorbate in solution

Answer: A

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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. $\Delta H < 0$

Answer: A

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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

Answer: D

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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 .

Answer: B

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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

Answer: A

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11. Which of the following is NOT an example of adsorption ?

A. Water on silica gel

B. Water on calcium chloride

C. hydrogen on finely divided nickel

D. Oxygen on metal surface

Answer: B

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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 temp./K	304	630	190	33

A. CO_2

B. SO_2

C. CH_4

D. H_2

Answer: D

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

(i) $2SO_2(g) + O_2(g) \xrightarrow{NO(g)} 2SO_3(g)$

(ii) $2SO_2(g) \xrightarrow{Pt(s)} 2SO_3(g)$

(iii) $N_2(g) + 3H_2(g) \xrightarrow{Fe(s)} 2NH_3(g)$

(iv)

$$CH_3COOCH_3(l) + H_2O(l) \xrightarrow{HCl\,(l)} CH_3COOH(aq) + CH_3OH(aq)$$

A. (ii),(iii)

B. `(ii),(iii),(iv)

C. (i),(ii),(iv)

D. (iv)

Answer: A

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

A. molecular colloid

B. associated colloid

C. macromolecular colloid

D. lyophilic colloid

Answer: B

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15. Which of the following will show Tyndall effect?

A. Aqueous solution of soap below critical micelle concentration

B. Aquenous solution of soap above critical micelle concentration

C. Aqueous solution of sodium chloride

D. Aqueous solution of sugar

Answer: B

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16. Method by which lyophobic sol can be protected.

A. By addition of oppositely charged sol

B. By adding on an electrolyte

C. By addition of lyophilic sol

D. By boiling

Answer: C

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

A. coagulation

B. electrolysis

C. diffusion

D. peptisation

Answer: D

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

A. Na_2SO_4

B. Na_3PO_4

C. Na_2SO_4

D. $NaCl$

Answer: D

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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

Answer: D

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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 of colloidal particles ..... .

A. exhibit enormous surface area

B. remain suspended in the dispersion medium

C. form lyophilic colloids

D. are comparatively less in number

Answer: D

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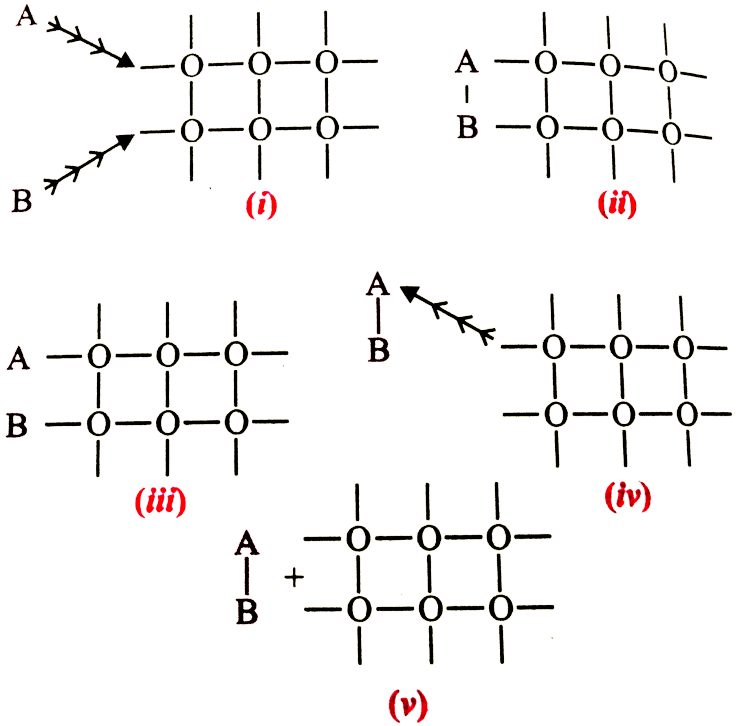
21. Arrange the following diagrams in correct sequence of stept in voolved in the mechanism of catalysis, in accordance with modern adsiorption theory.



A. $(i) \rightarrow (ii) \rightarrow (iii) \rightarrow (iv) \rightarrow (v)$

B. $(i) \rightarrow (iii) \rightarrow (ii) \rightarrow (iv) \rightarrow (v)$

C. $(i) \rightarrow (iii) \rightarrow (ii) \rightarrow (v) \rightarrow (iv)$

D. $(i) \rightarrow (ii) \rightarrow (iii) \rightarrow (v) \rightarrow (iv)$

Answer: B

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22. Which of the following process is responsible for the formation of delta at a place where rivers meet the sea?

A. Emulsification

B. Colloid formation

C. Coagulation

D. Peptisation

Answer: C

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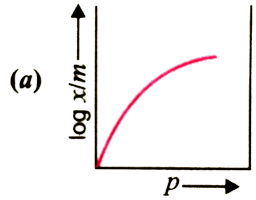
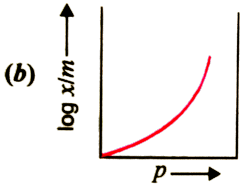
23. Which of the following curves is in accordance with Freundlich adsorption isotherm?

A.



B.



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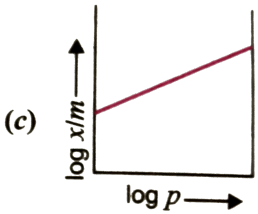

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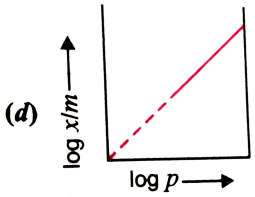

Answer: C

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24. Which of the following process is not responsible for the presence of electric charge on the sol particles?

A. Electron capture by sol particles

B. Adsorption of ionic species from solution

C. Formation of Helmholtz electrical double layer

D. Absorption of ionic species from solution

Answer: D

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25. Which of the following options are correct?

A. Micelle formation by soap in aqueous solution is possible at all temperatures

B. Micelle formation by soap in aqueous solution occurs above a particular concentration

C. On dilution of soap solution, micelles may revert to individual ions

D. Soap solution behaves as a normal strong electrolyte at all concentrations

Answer: C::D

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Multiple Choice Questions Ii

1. Which of the following statements are correct about solid catalyst?

A. Same reactants may give different product by using different catalysts

B. Catalyst does not change ΔH of reacton

C. Catalyst is required in large quantities to catalyse reactions

D. Catalytic activity of a solid catalyst does not depend upon the strength of chemisorption

Answer: A::B

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2. Freundlich adsorption isotherm is given by the expression $\frac{x}{m} = kp^{1/n}$. Which of the following conclusions can be drawn from this expression ?

A. When $\frac{1}{n} = 0,$ the adsorption is independent of pressure

B. When $\frac{1}{n} = 0,$ the adsorption is directly proporational to pressure

C. When $n = 0,$ $\frac{x}{m}$ vs p graph is a line parallel to x-axis

D. When $n = 0,$ plot of $\frac{x}{m}$ vs p is a curve

Answer: A::D

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3. H_2 gas is adsorbed on activated charcoal to a very little extent in comparison to easily liquefiable gases due to ..... .

A. very strong van der Walls interaction

B. very weak van der Walls forces

C. very low critical temperature

D. very high critical temperature

Answer: B::C

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4. Which of the following statements are correct ?

A. Mixing two oppositely charged sols neutralises their charges and stabilises the colloid

B. Presence of equal and similar charges on colloidal particles provides stability to the colloids

C. Any amount of dispersed liquid can be added to emulsion without destabilising it

D. Brownian movement stabilises sols

Answer: B::D

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5. An emulsion cannot be broken by .....and ..... .

A. heating

B. adding more amount of dispersion medium

C. freezing

D. adding emulsifying agent

Answer: B::D

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6. Which of the following substances will precipitate the negatively charged emulsions ?

A. KCl

B. glucose

C. urea

D. NaCl

Answer: A::D

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7. Which of the following colloids cannot be coagulated easily?

A. Lyophobic colloids

B. Irreversible colloids

C. Reversible colloids

D. Lyophilic colloids

Answer: C::D

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8. What happens when a Lyophilic sol is added to a Lyophobic sol?

A. Lyophobic sol is protected

B. Lyophilic sol is protected

C. Film of lyophilic sol is formed over lyophobic sol

D. Film of lyophobic sol is formed over lyophilic sol

Answer: A::C

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9. Which phenomenon occurs when an electric field is applied to a colloidal solution and electrophoresis is prevented?

A. Reverse osmosis takes place

B. Electroosmosis takes place

C. Dispersion medium beging to move

D. Dispersion medium becomes stationary

Answer: B::C

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10. In a reaction, catalyst changes ..... .

A. physically

B. qualitatively

C. chemically

D. quantitatively

Answer: A::B

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11. Which of the following phenomenon occurs when a chalk stick is dipped in ink?

A. adsorption of coloured substance

B. adsorption of solvent

C. absorption and adsorption both of solvent

D. absorption of solvent

Answer: A::D

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Short Answer Questions

1. Why is it important to have clean surface in surface studies ?

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2. Why is chemisorption referred to as activated adsorption?

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3. What type of solutions are formed on dissolving different concentrations of soap in water ?

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4. What happens when gelatin is mixed with gold sol ?

Watch Video Solution

5. How does it become possible to cause artificial rain by spraying silver iodide on the clouds?

Watch Video Solution

6. Gelatin which is a peptide is added in ice-creams. What can be its role ?

Watch Video Solution

7. What is collodion ?

Watch Video Solution

8. Why do we add alum to purify water ?

Watch Video Solution

9. What happens when aeledtric field is applied to colloidal solution ?

Watch Video Solution

10. What causes Brownian motion in colloidal dispersion?

Watch Video Solution

11. A colloid is formed by adding $FeCl_3$ in excess of hot water. What will happen if excess sodium chloride is added to this colloid?

Watch Video Solution

12. How do emulsifiers stabilise emulsion ? Name two emulsifiers.

Watch Video Solution

13. Why are some medicines more effective in the colloidal form ?

Watch Video Solution

14. Why does leather get hardened after tanning ?

Watch Video Solution

15. How does the precipitation of colloidal smoke take place in Cottrell precipitator?

Watch Video Solution

16. How will you distiguish between dispersed phase and dispersion medium in an emulsion ?

Watch Video Solution

17. On the basis of Hardy-schulze rule explain why the coagulating power of phosphate is higher than chloride ?

Watch Video Solution

18. Why does bleeding stop by rubbing moist alum?

Watch Video Solution

19. Why is $Fe(OH)_3$ colloid positively charged when prepared by adding $FeCl_3$ to hot water ?

Watch Video Solution

20. Why do physisorption and chemisorption behave differently with rise in temperature ?

Watch Video Solution

21. What happens when dialysis is prolonged?

Watch Video Solution

22. Why does the white precipitate of silver halide become coloured in the presence of dye eosin?

Watch Video Solution

23. What is the role of activated charcoal in gas mask used in coal mines?

Watch Video Solution

24. How does a delta form at the meeting place of sea and river water?

Watch Video Solution

25. Given an example where physisorption changes to chemisorption with rise in temperature. Explain the reason for change.

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26. Why is desorption important for a substance to act as good catalyst?

Watch Video Solution

27. What is the role of diffusion in heterogeneous catalyst?

Watch Video Solution

28. How does a solid catalyst enhance the rate of combination of gaseous molecules?

Watch Video Solution

29. Do the vital functions of the body such as digestion get affected during fever ? Explain your answer,

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Matching Type Questinos

1. Method of formation of solutionis given in Column I. Match it with the type of solution given in Column II.

Comumn I	ColumnII
(i)Sulphur vapours passed through cold water	(a)Norma
(ii)Soap mixed with water above critical micelle concentration	(b)Molecu
(iii)White of egg whipped with water	(c)Associ
(iv)Soap mixed with water below critical micelle concentration	(d)Macro

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2. Match the itemes given in Column I and Column II

Column I	**Column II**
(i) Protective colloid	(*a*) $FeCl_3$ + NaOH
(ii) Liquid-liquid colloid	(*b*) Lyophilic colloids
(iii) Positively charged colloid	(*c*) Emulsion
(iv) Negatively charged colloid	(*d*) $FeCl_3$ + hot water

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3. Match the iteims of Column I and Column II.

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4. Match list I (Colloidal dispersion) with list II (Nature of the dispersion) and select the correct answer using the codes given below the lists

Column I (Colloidal of dispersion)	Column II (Nature of dispersion
(A) Milk	1. Solid in liquid
(B) Clouds	2. Liquid in gas
(C) Paints	3 Solid in solid
(D) Jellies	4. Liquid in liquid
	5. Liquid in solid

A. $A-4, B-2, C-1, D-5$

B. $A-1, B-5, C-3, D-2$

C. $A-4, B-5, C-1, D-2$

D. $A-1, B-2, C-3, D-5$

Answer: A

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5. Match the cataltyst to the correct processes

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Assertion And Reason Type Questions

1. Assertion (A) An ordinary filter paper impregnated with collodion solution stops the flow of colloidal particles.

Reason (R) Pore size of the filter paper becomes more than the size of colloidal particle.

A. Assertion and reason both are correct and the reason is correct explanation of assertion.

B. Assertion and reason both are correct but reason does not expolain assertion.

C. Assertion is correct but reason is incorrect.

D. Both assertion and reason are incorrect.

Answer: c

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2. Assertion : Colloidal solution show colligative properties.

Reason : Colloidal solutions do not show brownian motion.

A. Assertion and reason both are correct and the reason is correct explanation of assertion.

B. Assertion and reason both are correct but reason does not expolain assertion.

C. Assertion is correct but reason is incorrect.

D. Both assertion and reason are incorrect.

Answer: c

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3. Assertion (A) Colloidal solutions do not show Brownian motion.

Reason (R) Brownian motion is responsible for stability of sols.

A. Assertion and reason both are correct and the reason is correct explanation of assertion.

B. Assertion and reason both are correct but reason does not expolain assertion.

C. Assertion is correct but reason is incorrect.

D. Both assertion and reason are incorrect.

Answer: e

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4. Assertion (A) Coagulation power of Al^{3+} is more than Na^{+}.

Reason (R) Greater the valency of the flocculating ion added, greater is its power to cause precipitation (Hardy-Schulze rule) .

A. Assertion and reason both are correct and the reason is correct explanation of assertion.

B. Assertion and reason both are correct but reason does not expolain assertion.

C. Assertion is correct but reason is incorrect.

D. Both assertion and reason are incorrect.

Answer: a

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5. Assertion (A) Detergents with low CMC are more economical to use.

Reason (R) Cleansing action of detergents involves the formation of

micelles. These are formed when the cocentration of detergents becomes equal to CMC.

A. Assertion and reason both are correct and the reason is correct explanation of assertion.

B. Assertion and reason both are correct but reason does not expolain assertion.

C. Assertion is correct but reason is incorrect.

D. Both assertion and reason are incorrect.

Answer: a

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Long Answer Questions

1. What is the role of adsorption in heterogeneous catalysis?

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2. What are the applications of adsorption in chemicaal analysis ?

Watch Video Solution

3. What is the role of adsorption in froth floatation process used especially for concentration of sulphide ores ?

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4. What do you understand by shape selective catalysis? Why are zeolites good shape selective catalysts?

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5. Write a short note on adsorption. How does adsorption differ from absorption ? What are different type of adsorption ?

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6. Expolain the terms-adsorption isotherm and adsorption isobar. Describe the Freundlich adsorption isotherm.

Watch Video Solution

7. How are colloid classified on the basis of: ltbtgt (a) physical state of components

(b) nature of dispersion medium

(c) interaction between dispersed phase and dispersion medium ?

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8. What is the difference between multimolecular and macromolecular collids ? Give one example of each . How are associated colloids different from these two types of colloids ?

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Additional Questions Very Short Answer Questions

1. Explain the meaning of the statement 'Adsorption is a surface phenomenon'.

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2. What are $\Delta G, \Delta H$ and ΔS for addorption of gas on solid adsorbent ?

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3. What is 'occulsion'?

Watch Video Solution

4. What do you mena by specific surface area of an adsorbent ?

Watch Video Solution

5. Which will adsorb more gas, a lump of charcoal or its powder and why ?

Watch Video Solution

6. What is physical adsorption.

Watch Video Solution

7. Why is chemisorption irreversible ?

Watch Video Solution

8. What is meant by chemical adsorption?

Watch Video Solution

9. Of physisorption and chemisorption which type of adsorption has a higher enthalphy of adsorption ?

Watch Video Solution

10. Give the expression of Freundlich isotherms.

Watch Video Solution

11. What from Freundich adsorption isotherm equation will take at high pressures ?

Watch Video Solution

12. How does increase in tempeature affect both physical and chemical adsorption ?

Watch Video Solution

13. Write one similarity between physisorption and chemisorption.

Watch Video Solution

14. Define shape selective catalysis. Give an example of a shape selective catalyst.

Watch Video Solution

15. What is $ZSM-5$? What is its formula ?

Watch Video Solution

16. Name two industrial processes in which heterogeneous catalysts are employed?

Watch Video Solution

17. Indicate a chemical reaction involving a homogeneous catalyst.

Watch Video Solution

18. Write down the heteroheneous catalyst involved in the polymerisation of ethylene.

Watch Video Solution

19. What is the role of desorption in the process of catalysis ?

Watch Video Solution

20. What is the range of particle size in colloidal solution in nm?

Watch Video Solution

21. Give an example of an associated colloid?

Watch Video Solution

22. Define Kraft temperatuer.

Watch Video Solution

23. Write two differences between multimolecular colloids and macromolecular colloids ?

Watch Video Solution

24. What are lyophobic colloids? Give one example for them.

Watch Video Solution

25. Hydrophobic sol is easily coagulated. Give reason.

Watch Video Solution

26. Name the type of colloid obtained when

(i) a liquid is dispersed in a solid (ii) a liquid is dispersed in a liquid.

Watch Video Solution

27. What type of colloid is formed when a liquid is dispersed in a solid? Give an example:

Watch Video Solution

28. What type of colloid is formed when a gas is dispesed in a liquid? Give an example.

Watch Video Solution

29. What are the physical states of dispersed phase and dispersion medium of forth ?

Watch Video Solution

30. Name the type of collloid of choeese.

Watch Video Solution

31. Given two exampoles of colloidal dispersion in which a liquid is dispersed in a solid. What are such colloidal dispersions called ?

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32. Define peptisation.

Watch Video Solution

33. How will you obtain a colodial sol of aresenious sulphide ?

Watch Video Solution

34. What is colloidion?

Watch Video Solution

35. How will you prepare colloidal solution of gold ?

Watch Video Solution

36. How can you make dialysis fast ?

Watch Video Solution

37. Why is colloidal system heterogenous ?

Watch Video Solution

38. Colloidal particle present in colloidal solution are good adsorber. Why ?

Watch Video Solution

39. Define Brownian movement.

Watch Video Solution

40. Define the term 'Tyndall effect'.

Watch Video Solution

41. What happens if an electric field is applied to a colloidal sol ?

Watch Video Solution

42. What is the main cause of charge on a colloidal solution?

Watch Video Solution

43. name the type of potential difference between fixed charged layer and diffused layer having opposite charges around the colloidal particles.

Watch Video Solution

44. Difine electrophoresis.

Watch Video Solution

45. Define coagulation.

Watch Video Solution

46. State Hardy schulze rule.

Watch Video Solution

47. Which of the following is the most effective electrolyte for the coagulation of (Fe2O3.H2O)Fe3+ sol ?

$KCl, AlCl_3, MgCl_2, K_4[Fe(CN)_6]$

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48. Out of potassium nitrate and aluminium nitrate which one is required in minimum concentration to coagulate arsenions sulphide sol.

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49. Define Gold number.

Watch Video Solution

50. Explain the utlity of alum for purifying water.

Watch Video Solution

51. Define emulsification.

Watch Video Solution

52. Given one example eacg of 'oil water' and 'water oil' emulsion.

Watch Video Solution

53. Write two difference between sols and emulsions.

Watch Video Solution

54. How can we remove moisture from glass apparatus?

Watch Video Solution

55. Write the main reason for the stability of colloidal sols.

Watch Video Solution

Short Answer Questions I Adsorption

1. What is adsorption ? Why adsorption takes place only at the interface?

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2. Differentiate between absorption and adsorption with examples.

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3. How do size of particles of adsorbent, pressure of gas and prevailling temperature influence the extent of adsorption of a gas on a solid ?

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4. Physical and chemical adsorptions respond differently to a rise in temperature. What is this difference and why is it so?

Watch Video Solution

5. Explain the meaning of the statement 'Adsorption is a surface phenomenon'.

Watch Video Solution

6. State the features of chemical adsorption which are not found with physical adsorption.

Watch Video Solution

7. Write three differences between physisorption and chemisorption.

Watch Video Solution

8. Mention any two factors which distiguish physisorption from chemisorption.

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9. Write the mathematical form of Freundlich adsorption isotherm. Explain the different symbols used in the equation and its limitations.

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10. Derive a mathematical expression showing the relationship between the extent of adsorption of a gas on a suface with pressure (within lower and higher ranges). Calculate the extent of adsorption at one atmosphere.

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11. What are 'adsorption isobars' ? In case of chemical adsorption, explain why adsorption first increases and then decreases.

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12. List four applications of adsorption.

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Short Answer Questions Ii Catalysis

1. What is mean by the term 'catalyst' in a chemical reaction? Mention the characteristic features of a catalyst.

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2. Taking two examples of heterogeneously catalyzed reactions, explain how a heterogeneous catalyst helps in the reaction.

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3. Differentiate between homogeneous and heterogenous catalysis with one example of each.

Watch Video Solution

4. What is the role of adsorption in heterogeneous catalysis?

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5. What happens when a freshly precipitated $Fe(OH)_3$ is shaken with little amount of dilute solution of $FeCl_3$?

Watch Video Solution

6. "Colloid is not a substance but a state of substance". Justify the statement.

Watch Video Solution

7. Give four industrial applications of enzymes along with the names.

Watch Video Solution

8. Define enzyme catalysis. What is the important reason for its specific action ?

Watch Video Solution

9. What do you understand by catalytic promoters? Explain by giving an example.

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Short Answer Questions Iii Colloids

1. Write dispersed phase and sispersion medium in (i) smoke (ii) milk.

Watch Video Solution

2. What are lyophilic and lyophobic sols ? Give one example of each type. Which one of these two types of sols is easily coagulated and why?

Watch Video Solution

3. What are micelles ? Give an example of a micelle system.

Watch Video Solution

4. How are the colloids classified on the basis of the nature of interaction between dispersed phase and dispersion medium ? Describe an important characteristic of each class ? Which of these sols need stabilizing agents for preservation ?

Watch Video Solution

5. What is a gel ? Give one example.

Watch Video Solution

6. Differentiate between the following pairs :

(i) Sols and Emulsions ,

(ii) Physical adsorption and chemisorption

(iii0 Lyophobic sols and lyophilic sols.

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7. What is the difference between multimolecular and macromolecular colloids ? Give one example of each How are associated colloids different from these two types of colloids ?

Watch Video Solution

8. Classify colloids where dispersion medium is water. State their characteristics and write one example of each of these classes.

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9. Explain the following terms giving a suitable example for each :

(i) Aerosol

(ii) Emulsion

(iii) Micelle

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10. Give four difference between lyophilic and lyophobic colloids.

Watch Video Solution

11. Explain briefly any three physical methods for the preparation of lyophobic sols.

Watch Video Solution

12. What are lyophobic sols ? Describe the preparation of a colloidal solution of ferric hydroxide by peptisation.

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13. What is peptization ? What is cause of peptization ? Illustrate with one example.

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14. Gold sol is prepared by Breding's arc method.

Watch Video Solution

15. Define each of the following terms:

(i) Micelles (ii) Peptization (iii) Desorption

Watch Video Solution

16. Explain Hardy-Schulze rule and peptization. Give examples.

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17. Colloidal arsenious sulphide is readily precipitated by a small amount of aluminum chloride. It is also precipitated by about seven times the amount of barium chloride and by several hundred times as much concentration of sodium chloride. Discuss the significance of these observations and state the rule based on them.

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18. Explain the observations :

Lyophilic colloid is more stable than lyophobic colloid.

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19. Explain the observations :

Coagulation takes place when sodium chloride solution is added to a colloidal solution of ferric hydroxide.

Watch Video Solution

20. Explain the observations :

Sky appears blue in colour.

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21. Explain what will you observe when

an electrolyte (NaCl) is added to hydrated ferric oxide sol

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22. Explain what will you observe when

an electric current is passed through a colloidal solution.

Watch Video Solution

23. Explain what will you observe when

a beam of light is passed through a sol.

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24. What is zeta potential ? Explain briefly.

Watch Video Solution

25. Define the following and give an example of each

(a) Coagulation (b) Tyndall effect.

Watch Video Solution

26. Colloids have many characteristic properties : Among these, Tyndall effect is an optical property and coagulation is the process of settling-down of colloidal particles.

(i) What is Tyndall effect ?

(ii) State Hardy-Schulze rule which deals with the coagulation of colloids by the addition of an electrolyte.

(iii) What is a protective colloid?

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27. Heat of adsorption is greater for chemisorption than physiorption. Why ?

Watch Video Solution

Watch Video Solution

28. What is collodion ?

Watch Video Solution

29. Differentiate between peptization and coagulation.

Watch Video Solution

30. Explain the following with example :

(a) Kraft temperature (b)Coagulation value.

Watch Video Solution

31. What are protective colloids? How are the colloids stabilised? Explain the term gold number.

Watch Video Solution

32. What are emulsions ? Write two applications of emulsification.

Watch Video Solution

33. What are emulsion ? How will you prepare a stable emulsion ? What are their different types ? Give examples.

Watch Video Solution

34. Describe the cleaning action of soap.

Watch Video Solution

35. What are the two classes of emulsions? Give one example of each class. State the activity to test the type of an emulsion.

Watch Video Solution

36. Mention two uses of each of colloids and emulsions.

Watch Video Solution

37. Distinguish between true solution and colloidal solution of the same colour.

Watch Video Solution

38. How are the following sols in water prepared ?

(i) Sulphur (ii) Ferric hydroxide

Watch Video Solution

39. Explain why delta are formed where river and sea water meet.

Watch Video Solution

40. Same substance can act both as colloid and crystalloid. (T/F)

Watch Video Solution

41. Artificial rain is caused by spraying salt over clouds. (T/F)

Watch Video Solution

42. When a beam of light is passed through a colloidal sol, the path of the beam gets illuminated. (T/F)

Watch Video Solution

43. (a) Give one main difference between lyophilic anc lyophobic colloids.

(b) Explain

(i) A freshly formed precipitate of ferric hydroxide can be converted to a colloidal sol by shaking it with a small quantitiy of ferric chloride.

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Short Answer Questions Iv Miscelaneous

1. Write answers in one sentence each :

Who used th word 'catalyst' for first time ?

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2. Write answers in one sentence each :

Why does colloidal particle show Tyndall effect

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3. Write answers in one sentence each :

Cleansing action of soap is based on which principle ?

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4. In reference of Freundlich adsorption isotherm, write the expression for adsorption of gases on solids in the form of an equation .

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5. Write an important characteristics of lyophilic sols.

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6. Based on the type of particles in the dispersed phase and dispersion medium, give one example each of associated colloid and multimolecular colloid.

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7. Why does leather get hardened after tanning ?

Watch Video Solution

8. Lyophilic sols are more stable than lyophobic sols because.

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9. Give reasons for the observations :

It is necessary to remove CO when ammonia is prepared by Haber's process.

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10. Differentiate between adsorption and absorption.

Watch Video Solution

11. Out of $MgCl_2$ and $AICI_3$ which one is more effective in causing coagulation of negatively charged sol and why?

Watch Video Solution

12. Out of sulphur sol and proteins, which one forms multimolecular colloids?

Watch Video Solution

13. Write one difference in each of the following:

(i) Lyophobic sol Lyophilic sol

(ii) Solution and Colloid

(iii) Homogenous catalysis and Heterogeneous catalysis

Watch Video Solution

14. Write one difference between each of the following:

(i) Multimolecular colloid and Macromolecular colloid

(ii) Sol and Gel

(iii) O/W emulsion and W/O emulsion

Watch Video Solution

15. Write on difference in each of the following:

(a) Multimolecular colloid and Associated colloid

(b) Coagulation and Peptization

(c) homogenous catalysis and Heterogeneous catalysis.

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16. Write the dispersed phase and dispersion medium of milk.

Watch Video Solution

17. Write one similarity between physisorption and chemisorption.

Watch Video Solution

18. Write the chemical method by with $Fe(OH)_3$ sol is prepared from $FeCl_3$.

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19. Define the following with an example each :

(a) Lyophobic colloids

(b) Homogeneous catalysis

(c) O/W emulsion.

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Higher Order Thinking Skills Hots Questions

1. Why the sun looks red at the time of setting ? Expain on the basic of colloidal properties.

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2. Addition of H_2 to accetylene gives ethane in presence of palladium but if $BaSO_4$ and quinoline or sulphur are also added, the product is ethene. Why ?

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3. SnO_2 form a positively charged colloidal sol in the acidic medium and negatively charged sol in the basic medium. Explain.

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4. Explain the giving reasons :

Rate of physical adsorption decreases with rise of temperature.

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5. Explain giving reasons :

Cause of brownian movement.

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6. Explain the giving reasons :

Colloidal particles scatter light.

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7. How does the rate of enzyme-catalysed reactions vary with (i) temperature (ii) pH? Represent diagrammatically.

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Hots Problems

1. A sample of charcoal weighing $6g$ was brought into contact with a gas contained in a vessel of one litre capacity at $27^{\circ}C$. The pressure of the gas was found to fall from 700 to 400 mm. Calculate the volume of the gas (reduced to STP) that is adsorbent under the condition of the experiment $\left(\text{density of charcoal sample is} 1.5 gcm^{3}\right)$.

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2. One gram of charcoal adsorbs 100 mL of 0.5 MCH_3COOH to form a mono-layer and thereby the molarity of acetic acid is reduced to 0.49 M. Calculate the surface area of the charcoal adsorbed by each molecule of acetic acid. Surface acid of charcoal $= 3.01 \times 10^{2} m^{2} / gm$

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3. In an adsorption experiment, a graph between log $\left(\frac{x}{m}\right)$ versus log P was found to be linear with a slope of 45° . The intercept on the log $\left(\frac{x}{m}\right)$ axis was found to be 0.3010 . Calculate the amount of the gas adsorbed per gram of charcoal under a pressure of 0.5 atm` .

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4. The volume of nitrogen gas Um (measured at STP) required to cover a sample of silica get with a mono-molecular layer is $129 cm^3 g^{-1}$ of gel. Calculate the surface area per gram of the gel if each nitrogen molecule occupies $16.2 \times 10^{-20} m^2$.

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Value Based Questions

1. Methylate spirit (ethyl alcohol containing a small amount of methyl alcohol) is used fo cleaning the wooden furnitue of doors windows etc. becore polishing them. Quite often, some incident are reported where people die due to drinking of this spirit. This is inspite of the fact that copper sulphate is added to it which gives it a blue colour to give a warning that it is not meant for drinking.

After reading the above paragraph, answer the questions :

As a good citizen, what do you suggest should be done to prevent people from drinking spirit ?

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2. Methylate spirit (ethyl alcohol containing a small amount of methyl alcohol) is used fo rcleaning the wooden furnitue of doors windows etc. becore polishing them. Quite often, some incident are reported where people die due to drinking of this spirit. This is inspite of the fact that copper sulphate is added to it which gives it a blue colour to give a warning that it is not meant for drinking.

After reading the above paragraph, answer the questions :

What is the role of spirit used for cleaning the wooden surface before polish ?

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3. Methylate spirit (ethyl alcohol containing a small amount of methyl alcohol) is used fo rcleaning the wooden furnitue of doors windows etc. becore polishing them. Quite often, some incident are reported where people die due to drinking of this spirit. This is inspite of the fact that copper sulphate is added to it which gives it a blue colour to give a warning that it is not meant for drinking.

After reading the above paragraph, answer the questions :

Why is methylate spirit poisonous ?

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4. During the manufacture of canesugar, unwanted colours are removed by adsorbing them on charcoal. It is often heard that in getting white

sugar, in the final stage, the concentrated solution is filtered through animal bone charcoal. This sometimes leads to the belief that sugar is not vegetarian. Similarly, many medicines are prepared by using alcohol as one of the solvent and some people do not want to use that medicine because it contains alcohol.

After reading the above paragraph, answer the questions:

What values are expressed in the above paragraph ?

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5. During the manufacture of canesugar, unwanted colours are removed by addorbing them on charcoal. It is often heard that in getting white sugar, in the final stage, the concentrated solution is filtered through animal bone charcoal. This sometimes leads to thebelief that sugar is not vegetarian. Similarly, many medicines are prepared by using alcohol as one of the somvent and some people do not want to use that medicine because it contains alcohol.

After reading the above paragraph, answer the questions:

How is the principle of adsorption used by workers in the coal mines ?

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Competition Focus Multiple Choice Questions I Adsorption

1. Asforption is accompained by

A. decrease in enthalpy anc increase in entropy

B. increase in enthalpy and increase in entropy

C. decrease in enthalpy and decrease in entropy

D. no change in enthalpy and entropy

Answer: C

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2. The correct ascending order of adsorption of the following gases on the same mass of charcoal at the same temperature and pressure is

A. $CH_4 < H_2SO_2$

B. $H_2 < CH_4 < SO_2$

C. $SO_2 < CH_4 < H_2$

D. $H_2 < SO_2 < CH_4$

Answer: B

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3. Which of the following are the characteristics of chemisorptin ?

1. High heat of adsorption

2. Irreversibility

3. Low activation energy

Select the correct answer using the code given below :

A. 1 and 2 only

B. 1 and 3 only

C. 2 and 3 only

D. 1, 2 and 3

Answer: A

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4. Although nitrogen does not adsorb on surface at room temperature, it adsorbs on the same surface at $83K$. Which one of the following statements is correct?

A. At 83 K, there is formation of monomolecular layer.

B. At 83 K, there is formation of multimolecular layer.

C. At 83 K, nitrogen molecules are held by chemical bonds.

D. At 83 K, nitrogen is adsorbed as atoms.

Answer: B

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5. Which of the following relations is /are correct?

(i) $x/m =$ constant (at high pressure)

(ii) $x/m =$ constant $\times P^{1/n}$ (at intermediate pressure)

(iii) $x/m =$ constant $\times P^{n}$ (at low pressure)

A. all are correct

B. all are wrong

C. (i) and (ii) are correct

D. (iii) is correct

Answer: C

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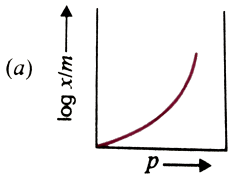
6. Which of the following curves is in accordance with Freundlich adsorption isotherm ?

A. 

B. 

C. 

D. 

Answer: D

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7. 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 o fphysical adsorption

D. 1 in case of chemisorption

Answer: A

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8. According to Freundlich adsorption isotherm, which of the following is correct ?

A. $\frac{x}{m} \propto p^{\circ}$

B. $\frac{x}{m} \propto p^{1}$

C. $\frac{x}{m} \propto p^{1/n}$

D. All the above are correct for different ranges of pressure

Answer: D

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9. For a gas adsorbed on a particular adsorbent at $0^{\circ}C$, the plot of log $\frac{x}{m}$ versus log P where P is in atm has a slope an intercept as shown in

the Fig.

The mass of the gas adsorbed by 10 g of the adsorbent at 0.2 atm is

A. 2 g

B. 4 g

C. 6 g

D. 8 g

Answer: B

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10. the Langmuir adsorption isotherm is deduced using the assumption.

A. The adsorbed molecules interact with each other

B. The adsorption takes place in multi layers

C. The adsorption sites are equivalent in their ability to adsorb the particles

D. The heat of adsorption varies with the coverage

Answer: C

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11. Which of the following statements are correct with respect to adsorption of gases on a solid ?

(i) The ectent of adsorption is equal to KP^n according to Freundlich isotherm.

(ii) The extent of adsorption is equal to $KP^{1/n}$ according to Frendlich isotherm.

(iii) The extent of adsorption is equal to (1+bP)/aP according to Langmuir isotherm.

(iv) The extent of adsorption is equal to aP/(1+bP) according to Langmuir

isotherm.

(v) Freundlich adsorption isotherm fails at low temperature.

A. 1 and 3

B. 1 and 4

C. 2 and 3

D. 2 and 4

Answer: D

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

A. $\frac{x}{m} p \times T$

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

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

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

Answer: A

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13. What is the equation form of Langmuir adsorption isotherm undre high pressure?

A. $\frac{x}{m} = \frac{a}{b}$

B. $\frac{x}{m} = aP$

C. $\frac{x}{m} = \frac{1}{a.\,P}$

D. $\frac{x}{m} = \frac{b}{a}$

Answer: A

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14. $3g$ of actived chacoal was added to 50mL of acetic acid solution $(0.06N)$ in a flask. After an hour it was filterred and the strength of the filtrate was found to be $0.042N$. The amount of acetic adsorbed (per gram of charcoal) is:

A. 42 mg

B. 54 mg

C. 18 mg

D. 36 mg

Answer: C

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15. Which of the following statement is correct for the spontaneous adsorption of a gas?

A. ΔS is negative and, therefore, ΔH should be highly positive

B. ΔS is negative and, therefore, ΔH should be highlt negative

C. ΔS is positive and, therefore, ΔH should be negative

D. ΔS is positive and, therefore, ΔH should also be highly positive

Answer: B

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16. For a linear plot of log (x/m) versus log p in a Freundlich adsorption isotherm, which of the following statements is correct ? (K and n are constants)

A. Both k and 1/n appear in the slope term

B. 1/n appears as the intercept

C. Only 1/n appears as the slope

D. log (1/n) appears as the intercept

Answer: C

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17. 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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Competition Focus Multiple Choice Questions Ii Catalysis

1. $CO(g) + H_2(g) \xrightarrow{Cu} X$

$CO(g) + H_2(g) \xrightarrow{Cu / ZnO - Cr_2O_3} Y$

$CO(g) + H_2(g) \xrightarrow{Ni} Z$

X,Y and Z respectively are

A. $CH_3OH, HCHO, CH_4$

B. $HCHO, CH_3OH, CH_4$

C. CH_4, CH_3OH, kCH_4

D. $CHOH, CH_4, CH_3OH$

Answer: B

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2. Decomposition of H_2O_2 is prevented by

A. glycerol

B. acetanilide

C. phosphoric acid

D. all of these

Answer: D

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3. An example of autocatalysis is

A. oxidiation of NO to NO_2

B. oxidation of SO_2 to SO_3

C. odecomposition of $KClO_3$ to KCl and O_2

D. oxidation of oxalic acid by acidified $KMnO_4$

Answer: D

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4. Hydrolysis of protein in the stomach and interstine takes place due to presence of the enzymes

A. trypsin and pepsin respectively

B. pepsin and trypsin respectively

C. trypsin in both cases

D. pepsin in both cases

Answer: B

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5. Given below, catalyst and corresponding process/reaction are matched.

The mismatch is

A. $\left[RhCl(PPh_3)_2\right]$: hydrogenation

B. $TiCl_4 + Al(C_2H_5)_3$: polymerization

C. V_2O_5 : Haber-Bosch process

D. nickel : hydrogenation

Answer: C

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6. The addition of catalyst during a chemical reaction alters which of the following quantities?

A. Enthalpy

B. Activation energy

C. Entropy

D. Internal energy

Answer: B

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

A. Catalyst does not initiate any reaction

B. The value of the equlibrium constant is changed in the presence of a catalyst in the reaction at equlibrium

C. Enzymes catalyse many bio-chemical reactions

D. Coenzymes increase catalytic activity of enzyme

Answer: B

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Competition Focus Multiple Choice Questions Iii Colloids

1. The volume of a colloidal particle V_C as compared to the volume of a solute particle in a true solution V_S could be

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

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

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

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

Answer: D

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2. The dispersed phase and dispersion medium in soap lather are respectively :

A. gas and liquid

B. liquid and gas

C. solid and gas

D. solid and liquid

Answer: A

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3. Fog is a collodal solution of:

A. solid in gas

B. gas in gas

C. liquid in gas

D. gas in liquid

Answer: C

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4. Which one of the following is correctly matched ?

A. Aerosol-hair cream

B. Gel-butter

C. Foam-mist

D. Sol-whipped cream

Answer: B

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5. the stability of lyophilic colloids is due to

A. same charge on all the colloidal particles

B. solvation of the colloidal particles

C. both (a) an d (b)

D. the fact that they are organic substances

Answer: C

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6. Which of the following colloids cannot be easily coagulated ?

A. Multimolecular colloids

B. Irreversible colloids

C. Lyophobic colloids

D. Macromolecular colloids

Answer: D

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7. Among the following, the surfactant that will form micelles in aqueous solution at the lowest molar concentration at ambient condition is

A. $(CH_3)(CH_2)_{15}N^+(CH_3)_3Br^-$

B. $CH_3(CH_2)_{11}OSO_3^-Na^+$

C. $CH_3(CH_2)_6COO^-Na^+$

D. $CH_3(CH_2)_{11}N^+(CH_3)_3Br^-$

Answer: A

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8. When an excess of a very dilute aqueous solution of KI is added to a very dilute aqueous solution of silver nitrate, the colloidal particles of silver iodide are associated with which of the following Helmholtz double layer ?

A. $Ag : Ag^+ : I^-$

B. $AgI : K^+ : NO_3^-$

C. $AgI : NO_3^- : Ag^+$

D. $AgI : I^- : K^+$

Answer: D

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9. When dilute aqueous solution of $AgNO_3$ (excess) is added to KI solution, positively charged sol of Agl in formed due to adsorption of

A. NO_3^-

B. O_2^-

C. Ag^+

D. K^+

Answer: C

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

(a) The diameter of the dispersed particles is much smaller than the wavelength of the light used.

(b) The diameter of the dispersed particles is not much smaller than the wavelength of the light used

(c) The refractive indices of the dispersed phase and dispersion medium are almost similar in magnitude.

(d) The refractive indices of the dispersed phase and dispersion medium differ greatly in magnitude.

A. (i) and (ii)

B. (ii) and (iii)

C. (i) and (iv)

D. (ii) and (iv)

Answer: D

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11. Intensity of the scattered light depends upon the difference of which of the following property of the dispersed phase and the dispersion medium ?

A. densities

B. viscosities

C. surface tension

D. refractive indices

Answer: D

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12. The speed of colloidal particles in a colloidal sol at different pH values during electrophoresis are given below :

pH	4.20	4.56	5.20	5.65	6.30	7.0
Speed $(\mu m s^{-1})$	$+0.50+$	0.18	-0.25	-0.65	-0.90	-1.25

(opposite signs indicate opposite direction of travel)

The isoelectric point of the colloidal sol will be

A. 4.2

B. 4.8

C. 7.0

D. 5.20

Answer: B

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13. Glutamic acid, $H_2NCH(CH_2CH_2COOH).COOH$ has $Pk_\alpha, (\alpha - COOH) = 22, Pk_{\alpha_2}\left(\alpha - \overset{+}{N}H_3\right) = 9.8$and pK_{α_3}(R group COOH)=4.3. The isoelectric point of glutamic acid is

A. 5.9

B. 7.0

C. 10.2

D. 3.2

Answer: D

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14. Which of the following electrolyte will have maximum flocculation value for $Fe(OH)_3$ sol ?

A. $NaCl$

B. Na_2S

C. $(NH_4)_3PO_4$

D. K_2SO_4

Answer: A

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15. Among the electrolytes $Na_2, SO_4, CaCl_2, Al_2(SO_4)_3$ and NH_4Cl, the most effective coagulating agent for Sb_2S_3 sol is

A. Na_2SO_4

B. $CaCl_2$

C. $Al_2(SO_4)_3$

D. NH_4Cl

Answer: C

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16. The coagulation of 200 mL of a positive sol took place when 0.73 g HCl was added to it without changing the volume much. The flocculation value of HCl for the colloid is :

A. 0.365

B. 36.5

C. 100

D. 1.50

Answer: C

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17. The ratio of the numer of moles of $AgNO_3$, $Pb(NO_3)_2$ and $Fe(NO_3)_3$ required for coagulation of a difinite amount of a colloidal sol of silver iodide prepared by maxing $AgNO_3$ with excess of KI will be

A. $1:2:3$

B. $3:2:1$

C. $6:3:2$

D. $2:3:6$

Answer: C

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18. Ferric chloride is applied to stop bleeding cut because

A. Fe^{3+} ion coagulates blood which is a negatively charged sol.

B. Fe^{3+} ion coagulates blood which is a positively charged sol.

C. Cl^{-} ion coagulates blood which is positively charged sol.

D. Cl^{-} ion coagulates blood which is a negatively charged sol.

Answer: A

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19. Tanning of leather is

A. colouring of leather by chemicals

B. drying process to make the leather hard

C. polishing of leather to make it look attractive

D. hardening of leather by coagulation

Answer: D

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20. Gelatine is mostly used in making ice creams in order to

A. prevent forming the colloidal sol

B. enrich the fragrance

C. prevent crystallisation and stabilise the mix

D. modify the taste

Answer: C

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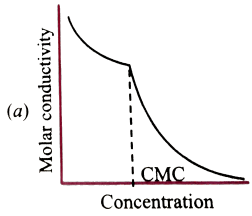
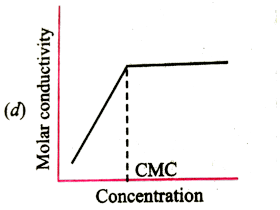
21. Which of the following plot correctly represents the variation of a concentration of a surfactant (e.g., sodium dodecyl sulphate) versus molar conductivity with regard to behavior art CMC

A. 

B. 

C. 

D. 

Answer: A

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22. Which one of the following has minimum gold number ?

A. starch

B. sodium oleate

C. gum arabic

D. gelatin

Answer: D

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23. On addition of one mL solution of 10% NaCl to 10 mL gold sol in the presence fo 0.0250 g of starch, the coagulation is just prevented. Starch has the following gold number

A. 0.025

B. 0.25

C. 2.5

D. $25.$

Answer: D

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24. Gold number of gum arabic is 0.15. The amount of gum arabic required to protect 100 mL of red gold sol from coagulation by 10 mL of $10\ \%$ NaCl solution is

A. 0.15 milimoles

B. 0.15 mg

C. 1.5 millimoles

D. 1.5 mg

Answer: D

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25. 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. $A < A < C < B$

D. $C < B < D < A$

Answer: A

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26. Which one of the following does not involved coagulation ?

A. Formation of delta regions

B. Peptization

C. Treatment of drinking water by potash alum

D. Clotting of blood by the use of ferric chloride

Answer: B

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27. which property of colloidal solution is independent of charge on the colloidal particles ?

A. Electro-osmosis

B. Tyndall effect

C. Coagulation

D. Electrophores

Answer: B

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28. At CMC, the surfactant molecules :

A. hydrolyse

B. dissociate

C. associate

D. dissolve competely

Answer: C

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29. The coagulation value in millimoles per litre of the electrolyes 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. $III > II > I$

B. $IIII > I > II$

C. $I > II > III$

D. $II > I > III$

Answer: A

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30. Select the wrong statement :

A. If a very small amount of $AlCl_3$ is added to gold sol, coagulation occurs but if a large quantity of $AlCl_3$ is added, there is no coagulation.

B. Organic ions are more strongly adsorbed on charged surfaces in comparison to inorgtanic ions.

C. Both emulsifier and peptising agent stabilise colloids but their actions are different.

D. Colloidal solutions are thermodynamically stable.

Answer: A

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Multiple Choice Questions

1. Which of the following statements are correct ?

A. Physical adsorption is multilayer, nondirectional and non-specific.

B. Chemical adsorption increases with increase of temperature.

C. In some case, solvent may be adsorbed in preference to the solute on the surface of the adsorbent.

D. As a result of adsorption, there is increase of surface energy.

Answer: B::C

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2. Which of the following will give linear plots ?

A. log (x/m) versus log C

B. log x/m versus 1/P

C. m/x verus 1/P

D. P/(x/m) versus P

Answer: A::C::D

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3. Which of the following is/are aerosols?

A. Smoke

B. Fog

C. Milk

D. Butter

Answer: A::B

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4. Which of the following is (are) lyophobic colloids ?

A. Gold sol

B. As_2S_3 sol

C. Starch sol

D. $Fe(OH)_3$ sol

Answer: A::B::D

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5. Which of the following are negatively charged sols ?

A. Gold sol

B. Prussian blue dye

C. Haemoglobin

D. Starch .

Answer: A::D

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6. Which of the following are correctly matched ?

A. Butter-gel

B. Milk-emulsion

C. For-aerosol

D. Dust-Solid sol

Answer: A::B::C

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7. Which of the following is/are elastic gel?

A. Gelatin

B. Silicic acid

C. Agar-agar

D. Starch

Answer: A::C::D

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8. Which of the following statements are not correct ?

A. A catalyst always increases the speed of a reaction.

B. A catalyst does not take part in the reaction

C. A catalyst may affect the nature of the products formed.

D. A catalyst is always an external substance added to the reaction mixture.

Answer: A::B::D

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9. Which of the following statements are wrong ?

A. Zeolites are hydrated aluminosilicates which can be used as such as shape-selective catalysts.

B. Enzymes show maximum activity when pH is either very low or very high.

C. Enzymes show maximum activity at room temperature $(20 - 25^{\circ} C)$.

D. Chemically, all enzymes are globular proteins.

Answer: A::B::C

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10. The correct statement(s) pertaining to the adsorption of a gas on a solid surface is (are)

A. Adsorption is always exothermic

B. Physisorption may transform into chemisorption at high temperature

C. Physisorption increases with increasing temperature but chemisorption decreases with increasing temperature

D. Chemisorption is more exothermic than physisorption, howerver it is very slow due to higher energy of activation

Answer: A::B::D

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11. Choose the correct reason (s) for the stability of lyophobic colloidal particles.

A. Preferential adsorption of ions on thir surface form the solution

B. Preferential adsorption of solvent on the surface from the solution

C. Attraction betweenn different particles having opposite charges on their surface

D. Potential difference between the fixed layer and the diffused layer of opposite charges around the colloidal particles

Answer: A::D

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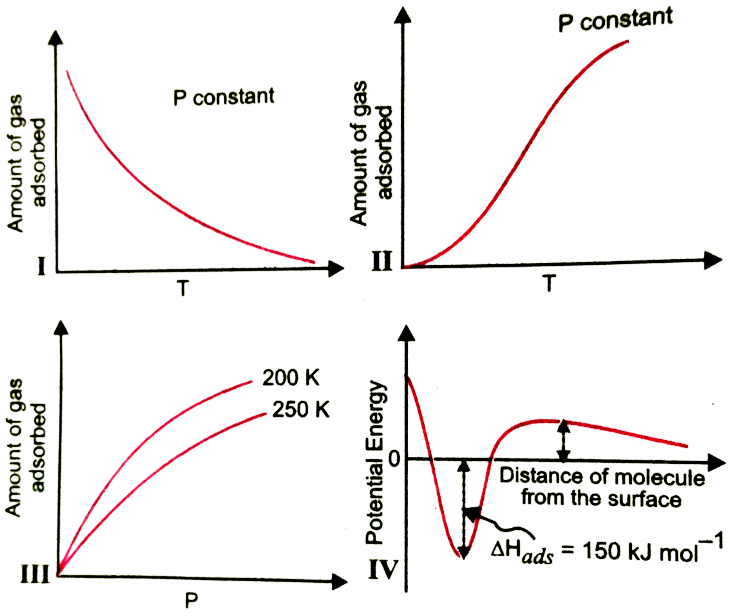
12. The given graphs/data I, II, III and IV represent general trends observed for different physisorption and chemisorption processes under mild conditions of temperature and pressure. Which of the following choice (s) about I, II, III and IV is (are) correct



A. I is physisorption and II is chemisorption

B. I is physisorption and III is chemisorption

C. IV is chemisorption and II is chemisorption

D. IV is chemisorption and III is chemisorption

Answer: A::C

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13. When O_2 is adsorbed on a metallic surface, electron transfer occurs form the metal to O_2. The true statement (s) regarding this adsorption is (are)

A. O_2 is physisorbed

B. heat is released

C. occupancey of π^*_{2p} of O_2 increased

D. bond length of O_2 is increased

Answer: B::C::D

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Iii Multiple Choice Questions

1. Which of the following result the chemist must have observed about his studies with KCl solution ?

A. Dilute KCl solution shows no adsorption whereas concentrated KCl shows adsorption.

B. Concentrated KCl solution shows no adsorption whereas dilute KCl solution adsorption.

C. Dilute KCl solution shows positive adsorption whereas concentrated KCl solution shows negative adsorption.

D. Concentrated KCl solution shows positive adsorption whereas dilute KCl solution shows negative adsorption.

Answer: D

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2. The correct order of adsorption of the gases studies will be

A. $NH_3 > SO_2 > CO_2 > HCl$

B. $CO_2 > SO_2 > NH_3 > HCl$

C. $SO_2 > NH_3 > HCl > CO_2$

D. $HCl > SO_2 > NH_3 > CO_2$

Answer: C

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3. Which of the following correctly represents the effect of increase of temperature on adsorption ?

A. Chemical adsorption increase regularly wherease physical adsorption first decreases and then increases.

B. Physical adsorption decreases regularly whereas chemical adsorption first increases and then decreases.

C. Chemical adsorption first decrease and then increase whereas physical adsorption shows the opposite trend.

D. Physical adsorption first decreases and then increases whereas chemical adsorption shows the opposite trend.

Answer: B

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4. Which of the following plot will not be linear ?

A. Plot of $\log \frac{x}{m}$ versus P

B. Plot of $\frac{P}{x/m}$ versus P

C. Plot of $\frac{m}{x}$ versus $\frac{1}{P}$

D. Plot of $\log \frac{m}{x}$ versus log P

Answer: D

View Text Solution

5. Which of the following is correct ?

A. Adsorption is always oxothermic

B. Adsorpton is always endothermic

C. Physical adsorption is endothermic whereas chamisorption is exothermic

D. Chemical adsorptin is exothermic whereas physical adsorption is endothermic.

Answer: A

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6. Which of the following does not form lyophilic sol ?

A. Rubber dissolved in benzene

B. White of the egg dissolved into water

C. Common salt added into benzene

D. Stannous chloride solution added to gold chloride solution.

Answer: D

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7. Critical micelle concentration (CMS) of soap solutions lies in the range

A. $10^{-6} - 10^{-5} M$

B. $10^{-5} - 10^{-4} M$

C. $10^{-4} - 10^{-3} M$

D. $10^{-3} - 10^{-2} M$

Answer: C

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8. In the experiment on elecro-osmosis, in which of the following the level of the dispersion medium will fall on the cathode side ?

A. Gold sol

B. Starch sol

C. $Fe(OH)_3$ sol

D. As_2S_3sol

Answer: C

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9. Which of the following has minimum gold number ?

A. Polato starch

B. Gum arabic

C. Gelatine

D. Albumen

Answer: C

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Integer Type Questions

1. Water vapour were introduced into a vessel containing the following substances : silica, alumina, quick lime, charcoal, calcium chloride, phosphorus pentoxide, calcium carbonate, powdered cellulose, kieselguhr, Fuller's earth. The number of cases of adsorption is

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2. The number of free valencies available for adsorption if four Pt atoms are linked together by convalent bonds is

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3. If 772 mL of SO_2 gas at STP is adsorbed on 2 g of charcoal at an equilibrium pressure of 16 atmospheres and the value of the constant 'k' in the Freundlich equation is 0.48. the value of the constant 'n' will be

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4. How many of the following are aerosols ?

Fog forth, soap lathr, smoke, clouds, mist, foam rubber, dust, insecticide spray, hair cream

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5. How many of the following are negatively charged sols ?

Silver sol, $Cr(OH)_3$ sol, As_2S_3 sol, starch sol, silicic acid sol, haemoglobin, congo red dye, prussion blue, gum, clay, charcoal.

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Assetion Reason Type Questions Type I

1. Assertion(A): Small quanity of soap is used to prepare a stable emulsion.

Reason(R): Soap lowers the interfacial tension between oil and water.

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation of Statement-1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is NOT a correct explanation of Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is Ture.

Answer: A

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2. Assertion: A sol of As_2S_3 prepared by the action of H_2S on As_2O_3 is negatively power.

Reason: It is due to the presence of S^{2-} ions in the diffused layer.

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation of Statement-1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is NOT a correct explanation of Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is Ture.

Answer: C

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3. Statement-1. For arsenic sulphide sol, $BaCl_2$ has higher coagulation value than NaCl.

Statement-2. Higher the valencey of the oppositely charged ion of the electrolyte added, higher is the coagulating power of the electrolyte.

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation of Statement-1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is NOT a correct explanation of Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is Ture.

Answer: D

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4. Assertion (A): Micelles are formed by surfactant molecules above the critical micellization concentration (CMC) .

Reason(R): The conductivity of a solution having surfactant molecules decreases sharply at the CMC .

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation of Statement-1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is NOT a correct explanation of Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is Ture.

Answer: B

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5. Assertion: Lyophilic colloids are more stable than lyophobic colloids.

Reason: In lyophobic system, the dispersed particles are more solvated than in lyophilic system.

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation of Statement-1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is NOT a correct explanation of Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is Ture.

Answer: C

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Assetion Reason Type Questions Type Ii

1. Assertion(A): Langmuir adsorption is a single-layer phenomenon.

Reason(R): It is due to van der Waals forces.

A. If both assertion and reason are ture, and reason is the trure explanation of the assertion.

B. If both assertion and reason are true, but reason is not the true explanation of the assertion.

C. If assertion is true, but reason is false.

D. If both assertion and reason false.

Answer: C

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2. Assertion(A): Physical adsorption of molecules on the surface requires activation energy.

Reason(R): Because the bonds of adsorbed molecules are broken.

A. If both assertion and reason are ture, and reason is the trure explanation of the assertion.

B. If both assertion and reason are true, but reason is not the true explanation of the assertion.

C. If assertion is true, but reason is false.

D. If both assertion and reason false.

Answer: D

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3. Assertion. The catalytic converter in the car's exhaust system converts polluting exhaust gases into non toxic gases

Reason Catalytic converter contains a mixture of transition metals and their oxides embedded in the inner support

A. If both assertion and reason are ture, and reason is the trure explanation of the assertion.

B. If both assertion and reason are true, but reason is not the true explanation of the assertion.

C. If assertion is true, but reason is false.

D. If both assertion and reason false.

Answer: A

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4. Assertion: Alcohols are dehydrated to hydrocarbons in the presence of acidic zeolites.

Reason: Zeolites are pourous catalysts.

A. If both assertion and reason are ture, and reason is the trure explanation of the assertion.

B. If both assertion and reason are true, but reason is not the true explanation of the assertion.

C. If assertion is true, but reason is false.

D. If both assertion and reason false.

Answer: B

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5. Assertion(A): Activity of an enzyme is pH dependent.

Reason(R): Change in pH affects the solution of the enzyme in water.

A. If both assertion and reason are ture, and reason is the trure explanation of the assertion.

B. If both assertion and reason are true, but reason is not the true explanation of the assertion.

C. If assertion is true, but reason is false.

D. If both assertion and reason false.

Answer: B

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6. Assertion : The micelle formed by sodium stereate in water has $-COO^-$ groups at the surface.

Reason : Surface tension of water is reduced by the addition of stereate.

A. If both assertion and reason are ture, and reason is the trure explanation of the assertion.

B. If both assertion and reason are true, but reason is not the true explanation of the assertion.

C. If assertion is true, but reason is false.

D. If both assertion and reason false.

Answer: A

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7. Assertion: A quious gold colloidal solution is red in colour.

Reason: The colour arises due to scattering of light by colloidal gold particles.

A. If both assertion and reason are ture, and reason is the trure explanation of the assertion.

B. If both assertion and reason are true, but reason is not the true explanation of the assertion.

C. If assertion is true, but reason is false.

D. If both assertion and reason false.

Answer: A

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8. Assertion: Fe^{3+} can be used for coagulation of As_2S_3 sol.

Reason: Fe^{3+} reacts with As_2S_3 to give Fe_2S_3.

A. If both assertion and reason are ture, and reason is the trure explanation of the assertion.

B. If both assertion and reason are true, but reason is not the true explanation of the assertion.

C. If assertion is true, but reason is false.

D. If both assertion and reason false.

Answer: C

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9. each question constain STATEMENT-1(Assertion) and STATEMENT - 2 (reason). examine the statement carefully and work the correct answer accoridng to the instructions given below :

STATEMENT-1: The conversion of fresh precipitate to colloidal state is called peptization.

STATEMENT-2: It is caused by addition of common ions.

A. If both assertion and reason are ture, and reason is the trure explanation of the assertion.

B. If both assertion and reason are true, but reason is not the true explanation of the assertion.

C. If assertion is true, but reason is false.

D. If both assertion and reason false.

Answer: B

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10. each question constain STATEMENT-1(Assertion) and STATEMENT - 2 (reason). examine the statement carefully and work the correct answer accoridng to the instructions given below :

STATEMENT-1: Colloidal solutions are stable but colloidal particles do not settle down.

STATEMENT-2: Brownian movement counters the force of gravity act on collooidal particles

A. If both assertion and reason are ture, and reason is the trure explanation of the assertion.

B. If both assertion and reason are true, but reason is not the true explanation of the assertion.

C. If assertion is true, but reason is false.

D. If both assertion and reason false.

Answer: A

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11. Assertion(A): In chemisorption, adsorption keeps on increasing with temperature.

Reason(R): Heat keeps on providing more and more activation energy.

A. If both assertion and reason are ture, and reason is the trure explanation of the assertion.

B. If both assertion and reason are true, but reason is not the true explanation of the assertion.

C. If assertion is true, but reason is false.

D. If both assertion and reason false.

Answer: D

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12. Assertion(A): Small quanity of soap is used to prepare a stable emulsion.

Reason(R): Soap lowers the interfacial tension between oil and water.

A. If both assertion and reason are ture, and reason is the trure explanation of the assertion.

B. If both assertion and reason are true, but reason is not the true explanation of the assertion.

C. If assertion is true, but reason is false.

D. If both assertion and reason false.

Answer: A

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13. Assertion: Isoelectric point is pH at which colloidal can move towards either of electrode.

Reason: At isoelectric point colloidal particles becomes electrically neutral .

A. If both assertion and reason are ture, and reason is the trure explanation of the assertion.

B. If both assertion and reason are true, but reason is not the true explanation of the assertion.

C. If assertion is true, but reason is false.

D. If both assertion and reason false.

Answer: D

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Viii Multiple Choice Questions

1. Which of the following are hydrophobic sols ?

A. Gum

B. Starch

C. Egg albumin

D. Ferric hydroxide

Answer: D

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2. Which of the following is false about hydrophilic sols

A. Egg albumin

B. Ferric hydroxide

C. Aresenious sulphide

D. Gold

Answer: A

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3. Ferric hydroxide sol is prepared by

A. treating ferric chloride with dilute sodium hydroxide solution

B. treating ferric chloride with dilute ammonium hydroxide solution

C. adding ferric chloride solution to boiling water

D. any onhe of the above methods

Answer: C

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4. Sol of egg albumin is prepared by

A. mixing the yolk and white of the egg by beating and then adding it into water

B. adding only the yolk of the egg into water

C. adding only the white of the egg into cold water

D. adding the white of the egg into hot water

Answer: C

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Important Questions For Board Examination

1. Why is it important to have clean surface in surface studies ?

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2. In an adsorption experiment, a graph between log $\left(\frac{x}{m}\right)$ versus log P was found to be linear with a slope of 45° . The intercept on the log $\left(\frac{x}{m}\right)$ axis was found to be 0.3010 . Calculate the amount of the gas adsorbed per gram of charcoal under a pressure of 0.5 atm`.

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3. Which will be adsorbed more readily on the surface of charcoal and why– NH_3 or CO_2?

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4. Adsorption of a gas on the surface of solid is sgenerally accompanied by decrease in entropy but still it is spontaneous in naturre. Explain.

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5. Give one point of similarity and three points of difference between physisorption and chemisorption.

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6. What is an adsorption isotherm? Describe Freundlich adsorption isotherm.

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7. What role does adsorption play in heterogeneous catalysis ?

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8. What is the role of activated charcoal in gas mask used in coal mines?

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9. Why is ester hydrolysis slow in the beginning and becomes faster after some time?

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10. What do you mean by activity and selectivity of catalysts ?

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11. Descirbe some features of catalysis by zeolites.

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12. What are enzymes ? Write in brief the mechanism of enzyme catalysis ?

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13. Do the vital functions of the body such as digestion get affected during fever ? Explain your answer,

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14. What is Ziegler-Natta catalyst ? Give the reaction for which it is used.

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15. Comment on the statement that colloid is not a substance but state of a substance

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16. What is the difference between multimolecular and macromolecular collids ? Give one example of each . How are associated colloids different from these two types of colloids ?

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17. What are lyophilic and lyophobic sols ? Give one example of each type.

Which one of these two types of sols is easily coagulated and why?

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18. What is collodion ?

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19. How will you obtain a colodial sol of aresenious sulphide ?

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20. How can you make dialysis fast ?

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21. Gold sol can be prepared by

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22. What happens when dialysis is prolonged ?

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23. What is common in aqua sols and solid aerosol? How do they differ?

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24. What happens when a colloidal sol of $Fe(OH)_3$ is mixed with that of As_2S_3 ?

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25. What will happen if gelatin is added to a goal sol ?

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26. The coagulatin of 100 mL of $10\,\%$ NaCl solution. Find out of gold number of starch.

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27. State Hardy schulze rule.

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28. For the coagulation of $100mL$ of arsenious sulphite $sol, 5mL$ of $1MNaCl$ is required. What is the flocculaton value of $NaCl$?

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