CHEMISTRY

BOOKS - BRILLIANT PUBLICATION

SURFACE CHEMISTRY

Questions Level I Homework

1. The term sorption stands for

A. A. absorption

B. B. absorption:

C. C. both absorption and adsorption occurring simultaneously

D. D. desorption.

Answer:

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2. Rate of physisorption increase with

A. decrease in temperature

B. increase in temperature

C. decrease in pressure

D. decrease in surface area

Answer:

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3. Variation of x/m vs P are plotted for a gas at different temperatures as shown below. The correct order of temperature is:

A. $T_1 > T_2 > T_3$

B. $T_3 > T_2 > T_1$

C. $T_2 > T_1 > T_3$

D. $T_2 > T_3 > T_1$

Answer:

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4. Which of the following is adsorbed greatly by activated charcoal

A. SO_2

B. CO_2

C. CO

D. Water vapour

Answer:

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5. According to freundlich adsorption isotherm, which of the following is correct?

A. $\frac{x}{m}\alpha P'$

B. $\frac{x}{m}\alpha P^{\frac{1}{n}}$

C. $\frac{x}{m}\alpha P^{0}$

D. All the above for different pressures

Answer:

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6. Bacterial infection on eye surface is protected by the enzyme:

A. urease

B. carbonic anhydrase

C. lysozyme

D. xymase

Answer:

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7. Which of the following process does not involve a catalyst?

A. Haber's process

B. Thermite process

C. Ostwald process

D. Contact process

Answer:

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8. Which statement about enzymes is not correct

A. Enzymes are in colloidal state

B. Enzymes are catalysts

C. Enzymes can catalyses any reaction

D. Urease is an enzyme

Answer:

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9. 4 g of N_2 is allowed to be adsorbed on a 2g solid surface at a 300 K and 1 atm, find the volume of gas adsorbed per gm of solid surface at 1 atm

A. 1.76 litre/g

B. 2.63 litre/g

C. 3.52 litre/g

D. 2.79 litre/g

Answer:

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10. Which of the following are applications of adsorption

A. A. Chromatography

B. B. Charge on colloidal particle

C. C. Heterogeneous catalyst

D. D. All the above

Answer:

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11. Milk is a colloid in which

A. liquid in liquid

B. solid in liquid

C. gas in liquid

D. sugar in liquid

Answer:

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12. The process of preparation of colloidal solution is

A. peptisation

B. condensation

C. sedimentation

D. fragmentation

Answer:

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13. The diameter of the colloidal particle may range from

A. 1 to 1000 nm

B. 10 to 100 ppm

C. 1 to 1000 ppm

D. 1 to10nm

Answer:

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14. Which of the following does not involve coagulation

A. Clotting of blood by ferric chloride

B. Delta formation

C. Treatment of water by potash alum

D. Peptization

Answer:

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15. The solution of which one of the folloiwng will be least effective in coagulation of $Fe(OH)_3$ sol?

A. $K_4[Fe(CN)_6]$

B. $K_2Cr_2O_4$

C. KBr

D. K_2SO_4

Answer:

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16. Which does not cause coagulation of colloidal solution?

A. A.Filtration

B. B. Non electrolyte

C. c. Electrolyte

D. D. All

Answer:

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17. When dilute aqueous solution of $AgNO_3$ (excess) is added to Kl solution, positively charged sol particles of Agl are formed due to adsorption of

A. K^+

B. Ag^+

C. I^-

D. NO_3^-

Answer:

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18. Ultra microscope works on the principle of

A. A. light reflection

B. B. light absorption

C. C. light scattering

D. D. light polarization

Answer:

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19. Among the electrolytes $Na_2SO_4, CaCI_2, AI_2(SO_4)_3$ and NH_4CI 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:

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20. The Brownian motion is due to

A. Temperature fluctuations within the liquid phase

B. Attraction and repulsion between charge on the colloidal particles

C. Impact of the molecules of the dispersion medium on the colloidal particle

D. Convective currents

Answer:

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Questions Level Ii

1. 1.30 litre of O_2 gas at 1 atm and 300 K is exposed to a solid surface of 3g in a container. After adsorption the pressure of O_2 is reduced to 0.7 atm. What is the value of $\frac{x}{m}$

A. 0.216

B. 0.169

C. 0.961

D. 0.323

Answer:

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2. Freundlich adsorption isotherm to the value of $\frac{1}{n}$ is

A. A. between 0 and 1 in various cases

B. B. between 0 and 1 in all cases

C. C. 1 in case of physisorption

D. D. 1 in case of chemisorption

Answer:

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3. During adsorption of a gas on the surface of a solid. Which of the following is true?

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

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

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

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

Answer:

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4. Which of the following is not charactristic of chemisorption?

A. multimolecular adsorption

B. specific adsorption

C. ΔH is of the order of 400 kJ

D. adsorption is irreversible

Answer:

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

A. 2

B. 0.5

C. 0.25

D. 1

Answer:

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6. $Mg(OH)_2$ precipitate is white. But it appears blue when precipitated in presene of

A. A. Argyrol

B. B. Magneson

C. C. Eosin

D. D. $Fe(OH)_3$

Answer:

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7. Rate of physisorption increase with

A. decrease in temperature

B. increase in temperature

C. decrease in pressure

D. decrease in surface area

Answer:

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8. Catalytic activity of zeolites depends up on

A. pore size

B. aperture

C. cavity size

D. all of these

Answer:

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9. The ability of a catalyst to direct the reaction to yield a particular product is called

A. reactivity

B. selectivity

C. activity

D. fugacity

Answer:

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10. An example of autocatalysis is:

A. A. oxidation of NO to NO_2

B. B. Oxidation of SO_2 to SO_3

C. C. decomposition of $KCIO_3$ to KCI and O_2

D. D. Oxidation of oxalic acid by acidified $KMnO_4$

Answer:

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11. The physical state of dispersed phase and dispersion medium in colloid - like pesticide spray are respectively

A. solid, gas

B. gas, liquid

C. liquid, gas

D. liquid, solid

Answer:

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12. The formation of micelles which occurs only beyond a certain temperature is called

A. inversion temperature

B. Boyle temperature

C. Critical temperature

D. Kraft temperature

Answer:

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13. Among the following processes, which one is not a preparation method of colloidal solution

A. A. Peptisation

B. B. Condensation

C. C. Hydrolysis

D. D. Filtration

Answer:

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14. The simplest way to check whether a system is a colloid

A. Tyndall effect

B. Brownian movement

C. Electrodialysis

D. Finding out particle size

Answer:

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15. Movement of sol particle under an applied electric field is called

A. A. electro deposition

B. B. electrodialysis

C. C. electro-osmosis

D. D. electrophoresis

Answer:

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16. Which property of colloidal solution is independent of charge on the colloidal particle

A. Tyndall effect

B. Electrophoresis

C. Electro-osmosis

D. Coagulation

Answer:

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17. Which of the following electrolyte will have maximum flocculation - value of $Fe(OH)_3$ sol? $NaCl, Na_2SO_4, (NH_4)_3PO_4, K_2SO_4$

A. NaCl

B. Na_2S

C. $(NH_4)_3PO_4$

D. K_2SO_4

Answer:

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18. The coagulation of 200 ml of a positive colloid took place when 0.73 g HCI was added to it without changing the volume much. The flocculation value of HCI for the colloid is

A. 0.365

B. 100

C. 36.5

D. 150

Answer:

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19. Gold number of protective colloids A, B, C and D are 0.50, 0.01, 0.10 and 0.005 respectively. The correct order of their protecting power

A. $D < A < C < B$

B. $A < C < B < D$

C. $B < D < A < C$

D. $C < B < D < A$

Answer:

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20. 10^{-4} g of gelatin is required to be added to 100 ml of standard gold sol to just prevent its precipitation by addition of 1 ml of 10% NaCl

solution to it. Hence the gold number of gelatin is:

A. 10

B. 1

C. 0.1

D. 0.01

Answer:

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21. The disease Kala azar is cured by

A. Colloidal antimony

B. Argyrol

C. Colloidal gold

D. Colloidal suphur

Answer:

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22. Emulsifier is an agent which

A. Coagulate the emulsion

B. Homogenisis the emulsion

C. Stabilise the emulsion

D. Accelerate the dispersion of liquid in liquid

Answer:

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23. The name aqua dag is given to the colloidal sol of:

A. Copper in water

B. Platinum in water

C. Graphite in water

D. None of the above

Answer:

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24. The coagulating power of an electrolyte for arsenious súlphide sol decreases in the order : $Na^+ > Al^{3+} > Ba^{2+}$, $PO_4^{3-} > SO_4^{2-} > Cl^-$, $Cl^- > SO_4^{2-} > Po_4^{3-}$, $Al^{3+} > Ba^{2+} > Na^+$

A. $Ba^{2+} < Na^+ < Al^{3+}$

B. $Al^{3+} < Na^+ < Ba^{2+}$

C. $Al^{3+} < Ba^{2+} < Na^+$

D. $Na^+ < Ba^{2+} < Al^{3+}$

Answer:

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Questions Level Ii Assertion Reason Type Questions

1. Assertion: Enzymes are proteins and enzyme catalysed reactions are called biological catalysis.

Reason: The activity of enzyme catalysis increase in presence of vitamins.

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

B. Both assertion and reason are correct but reason is not the correct explanation of assertion

C. If assertion is correct and reason is not correct

D. Assertion is wrong and reason is correct

Answer:

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2. Assertion: Alcohols are dehydrated to hydrocarbon in the presence of acidic zeolites.

Reason: Zeolites are porous catalysts.

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

B. B. Both assertion and reason are correct but reason is not the B. correct explanation of assertion

C. C. If assertion is correct and reason is not correct

D. D. Assertion is wrong and reason is correct

Answer:

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3. Assertion: A colloidal sol of As_2S_3 is coagulated faster by 0.1 M $BaCl_2$ than by 0.1 M NaCl.

Reason: $BaCl_2$ give double the number of Cl^- ion than NaCl.

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

B. Both assertion and reason are correct but reason is not the correct explanation of assertion

C. If assertion is correct and reason is not correct

D. Assertion is wrong and reason is correct

Answer:

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4. Assertion: Small quantity of soap is used prepare a stable emulsion.

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

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

B. B. Both assertion and reason are correct but reason is not the correct explanation of assertion

C. C. If assertion is correct and reason is not correct

D. D. Assertion is wrong and reason is correct

Answer:

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5. Assertion: Colloidal gold is used for intramuscular injection.

Reason: Colloidal medicines are more effective because they have large surface area and are therefore easily assimilated.

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

B. Both assertion and reason are correct but reason is not the correct explanation of assertion

C. If assertion is correct and reason is not correct

D. Assertion is wrong and reason is correct

Answer:

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

Reason: It is due to the absorption of H^+ ions on the surface of the colloidal particle and S^{2-} ions in the diffused layer.

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

B. B. Both assertion and reason are correct but reason is not the correct explanation of assertion

C. C. If assertion is correct and reason is not correct

D. D. Assertion is wrong and reason is correct

Answer:

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Questions

1. A graph between (x/m) vs log p gives a straight lien with slope equal to 45° and interecept on the log (x/m) axis as 0.3. Calculate the amount of gas adsorbed per gram of charcoal at a pressure of 0.95 atm.

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2. The mass x of a solute adsorbed per gram of a solid adsorbetn is given by the Freundlich adsorption isotherm as $a = kC^n$, where k and n are 0. 160 and 0.431 respectively. Calculate the amount of acetic acid that 1 kg of charcoal adsorbs from 0.837 M vinegar solution.

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Level I

1. Which of the following statements is not applicable to chemisorption?

A. It is slow

B. It is irreversible

C. It is highly specific

D. It is independent of temperature

Answer: D

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2. Which of the following types of catalysis can be explained by the adsorption theory?

A. Homogeneous catalysis

B. Acid base catalysis

C. Heterogeneous catalysis

D. Enzyme catalysis

Answer: C

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3. In the reaction $2SO_2 + O_2 \xrightarrow[As_2O_3]{Pt} 2SO_3$, As_2O_3 acts as a.

A. Autocatalyst

B. Poison

C. Promotor

D. Positive catalyst

Answer: B

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4. Which of the following process does not involve a catalyst?

A. Haber's process

B. Thermite process

C. Ostwald process

D. Contact process

Answer: B

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5. Emulsifier is an agent which

A. Stabilises the emulsion

B. Homogenises the emulsion

C. Coagulates the emulsion

D. Accelerates the dispersion of liquid in liquid

Answer: A

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6. Which of the following constitutes irreversible colloidal system in water as dispersion medium?

A. Clay

B. Platinum

C. $Fe(OH)_3$

D. All of these

Answer: D

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7. 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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8. Select the correct statement for adsorption process.

A. ΔS of adsorption process is always +ve

B. ΔH of adsorption process is always,+ve

C. ΔG of adsorption process is always-ve

D. None of the above

Answer: C

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9. Intensity of Brownian movement increases by:

A. with increase in temperature

B. with increase in viscosity of medium

C. increasing particle size

D. None of the above

Answer: A

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10. Which of the following phenomenon is not related to the adsorption on the surface of a substance?

A. Occulsion

B. Heterogeneous catalysis

C. Peptization

D. Flocculation

Answer: D

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11. A gel is converted into a sol by shaking it with a dispersion medium. After some time it again becomes gel.

This property is called:

A. weeping

B. thixotropy

C. syneresis

D. none of these

Answer: B

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12. The minimum concentration of an electrolyte in milimoles per litre required to cause coagulation of a soI is called its :

A. flocculation value

B. protective value

C. gold number

D. critical value

Answer: A

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

A. $V_c / V_s = 10^{-3}$

B. $V_c / V_s = 10^3$

C. $V_c / V_s = 1$

D. $V_c / V_s = 10^{23}$

Answer: B

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14. In Langmuir's model of adsorption of a gas on a solid surface

A. the mass of gas striking a given area of surface is independent of the pressure of the gas

B. the rate of dissociation of adsorbed molecules from tthe surface does not depend on the surface covered

C. the adsorption at a single site on the surface may involve multiple molecules at the same time.

D. the mass of gas striking a given area of surface is proportional to the pressure of the gas.

Answer: D

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15. Gold number of protective colloids A, B, C and D are 0.50, 0.01, 0.10 and 0.005 respectively. The correct order of their protecting power

A. $B < D < A < C$

B. $\Delta < A < C < B$

C. $C < B < D < A$

D. $A < C < B < D$

Answer: D

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16. Which of the following statements is incorrect regarding physisorption ?

A. Under high pressure, it results into multimolecular layer on adsorbent surface.

B. Enthalpy of adsorption $(\Delta_{ads}H)$ is low and positive.

C. It occurs because of vander Waals forces

D. More easily liquefiable gases are adsorbed readily

Answer: B

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17. According to freundlich adsorption isotherm, which of the following is correct?

A. $(x/m) \propto P^{\circ}$

B. $(x/m) \propto P$

C. $(x/m) \propto P$

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

Answer: D

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18. The coagulating powers of electrolytes having ions Na^{+}, Al^{3+} and Ba^{2+} for arsenic sulphides sol increases in the order

A. $Al^{3+} < Ba^{2+} < Na^{+}$

B. $Na^+ < Ba^{2+} < Al^{3+}$

C. $Ba^{2+} < Na^+ < Al^{3+}$

D. $Al^{3+} < Na^+ < Ba^{2+}$

Answer: B

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19. Which of the following is not correct ?

A. The extent of adsorption depends on the nature of the adsorbent and adsorbate

B. The extent of adsorption depends on the pressure of the gas

C. The extent of adsorption depends on the temperature

D. The extent of adsorption has no upper limit

Answer: D

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20. Which of the following statements regarding adsorptoin is not true ?

A. The phenmenon of adsorption imples the presenc of execess concentration of adsobate at the surface of adsorbent

B. The phenomenon of adsorption is due to the presence of residual forces at the surface of the body

C. During adsorption, there occurs a decrease in free energy of the system

D. During adsorption there occurs an increase in entropy of the system

Answer: D

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21. Which of the followin graphs would yield a straight line plot ?

A. x/m versus p

B. log x/m versus p

C. log x/m versus log P

D. x/m versus log p

Answer: C

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22. Which of the following statements is not correct ?

A. The extent of physical adsorption is increases lineraly with increase in pressure in the low pressure region

B. The extent of physical adsorption attains a limiting value at the high pressure region.

C. In the intermediate range of pressure the increase in adsorption is more than the increases in pressure

D. Physical adsorption involves the reversibel process $G + S \underset{\text{desorption}}{\overset{\text{adsorption}}{\rightleftharpoons}} GS$ where G S and G S represent, respectively , the unabsorbed gaseous molecules, adsorption sites and adsorbed gaseous molecules.

Answer: C

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23. Which of the following statements is not correct ?

A. A colloidal solution is a heterogeneous two phase system

B. Silver sol in water is an example of lyophobic sol

C. Metal hydroxides in water are examples of lyohobic sol

D. Liquid-liquid colloidal solution is not stable system

Answer: B

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24. Which of the following colloidal systems represent a gel ?

A. Solid in liquid

B. Solid gas

C. Liquid in solid

D. Liquid in gas

Answer: C

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25. Which of the following represent multimolecular colloidal particles ?

A. Sol of sulphur

B. Starch

C. Gelatin

D. Proteins

Answer: A

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26. Which of the following statements is correct for lyophilic sols ?

A. The coagulation of the sols is irreversible in nature

B. They are formed by inorganic susbtances

C. They are self stabilised

D. They are readily coagulated by addition of electrolytes

Answer: C

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27. Which of the following sols is negatively charged ?

A. Arsenious sulphide

B. Aluminium hydroxide

C. Ferric hydroxide

D. Silver iodine in silver nitrate solution

Answer: A

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28. Which of the following statements is not correct ?

A. Peptization is the process by which certain substance are converted into the colloidal state.

B. Metal sols of gold, silver and platinum can be prepared by Bredig's arc method

C. Impurities present in a sol makes it more stable

D. Dialysis is a process to remove impurities of ions and molecules from a sol

Answer: C

29. At isoelectric point,

A. a collodial particle move towards cathode during electrophresis

B. a colloidal particle does not move either towards cathode or towards anode during electrophresis

C. a colloidal particle does not move either towards cathode or towards anode during electrophoresis

D. pH of medium becomes 7

Answer: C

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30. The Brownian motion is due to

A. temperature fluctuation within the liquid phase

B. electrostatic interactions between charged particles

C. convection current

D. impact of solvent molecules on the colloidal particles

Answer: D

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31. Tyndall effect is due to

A. scattering of light by colloidal particles

B. reflection of light by colloidal particles

C. refraction of light by colloidal particles

D. adsorption of light by colloidal particles

Answer: A

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

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

B. $CH_3(C_2)_{11}OSO_3^-Na^+$

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

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

Answer: A

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33. Among the electrolytes $Na_2SO_4, CaCI_2, AI_2(SO_4)_3$ and NH_4CI 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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34. The volume of gases H_2, CH_4, CO_2 and NH_3 adsorbed by 1 g of charcaoal at 288 K are in the order

A. $H_2 > CH_4 > CO_2 > NH_3$

B. $CH_4 > CO_2 > NH_3 > H_2$

C. $CO_2 > NH_3 > H_2 > CH_4$

D. $NH_3 > CO_2 > CH_4 > H_2$

Answer: D

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35. Which one of the following is not the example of homogeneous catalysis?

A. Formation of SO_3 in the chamber process

B. Formation of SO_3, in the contact process

C. Hydrolysis of an ester in presence of acid

D. Decomposition of $KCIO_3$ in presence of MnO_2

Answer: B

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36. TEL minimizes the knocking effect when mixed with petrol. It acts as

A. Positive catalyst

B. Negative catalyst

C. Auto-catalyst

D. Induced catalyst

Answer: B

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37. Which statement is wrong?

A. Haber's process of NH_3 requires iron as catalyst

B. Friedel-Craft's reaction requires anhydrous $AlCl_3$.

C. Hydrogenation of oils requires iron as catalyst

D. Oxidation of SO_2 , to SO_3 requires V_2O_5 requires

Answer: C

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

A. Protective action

B. Coagulation

C. Peptisation

D. Dialysis

Answer: C

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39. Bleeding is stopped by application of ferric chloride. This is because

A. The blood starts flowing in opposite direction

B. The ferric chloride seals the blood vessel

C. The blood reacts and forms a solid which seals the blood vessel

D. The blood is coagulated and thus, the blood vessel is sealed.

Answer: D

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40. On addition of one mL solution of 10% NaCl to 10 ml. gold sol in presence of 0.0025 g of starch, the coagulation is just prevented. The gold number of starch is

A. 2.5

B. 2.5

C. 0.25

D. 0.025

Answer: B

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41. Select correct statement(s),

A. Hydrophilic colloid is a colloid in which there is a strong attraction between the dispersed phase and water

B. Hydrophobic colloid is a colloid in which there is a lack of attraction between the dispersed phase and water

C. Hydrophobic sols are often formed when a solid crystallized rapidly from a chemical reaction or a supersaturated solution

D. All of the above

Answer: D

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42. Catalytic poisoning is due to:

A. increase in activation energy

B. adsorption of poison on the reactants surface

C. adsorption of poison on the catalyst surface

D. increase in heat of reaction

Answer: C

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43. Which is not correct about the reaction?

A. Pd acts as positive catalyst

B. It is Rosenmunds reaction

C. $BaSO_4$ acts as poison for Pd

D. $BaSO_4$ acts as promoter for Pd

Answer: D

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44. Setting of cement involves formation of:

A. gel

B. emulsion

C. sol

D. solid aerosol

Answer: A

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45. Identify the correct statement regarding enzymes:

A. Enzymes are specific biological catalysts and their action is independent of pH

B. Enzymes are normally homogeneous catalyst that are very specific in their action

C. Enzymes are specific biological catalyst that cannot be poisoned

D. Enzymes are specific biological catalysts that can normally function at very high temperature (T=1000K)

Answer: B

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46. Bredig's arc method involves:

A. dispersion

B. condensation

C. peptization

D. dispersion and condensation both

Answer: D

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47. A negatively charged sol will require minimum amount of which electrolyte for its coagulation?

A. $NaNO_3$

B. $Mg(NO_3)_2$

C. $Al(NO_3)_3$

D. $Th(NO_3)_4$

Answer: D

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48. In multimolecular colloidal sol, atoms or molecules are held together by

A. H-bonding

B. van der Waals' forces

C. ionic bonding

D. covalent bonding

Answer: B

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49. Rate of physisosrption increases with:

A. decrease in temperature

B. increase in temperature

C. decrease in pressure

D. decrease in surface area

Answer: A

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50. Adsorption of gases on solid surface is generally exothermic because:

A. enthlapy is positive

B. entropy decreases

C. entropy increases

D. free energy increases

Answer: B

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51. Which of the following statements is not applicable to chemisorption?

A. It is slow

B. It is irreversible

C. It is highly specific

D. It is independent of temperature

Answer: D

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52. Which of the following types of catalysis can be explained by the adsorption theory?

A. Homogeneous catalysis

B. Acid base catalysis

C. Heterogeneous catalysis

D. Enzyme catalysis

Answer: C

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53. In the reaction $2SO_2 + O_2 \xrightarrow[As_2O_3]{Pt} 2SO_3 As_2 SO_3$ acts as a

A. Autocatalyst

B. Poison

C. Promotor

D. Positive catalyst

Answer: B

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54. Which of the following processes does not involve a catalyst?

A. Haber's process

B. Thermite process

C. Ostwald process

D. Contact process

Answer: B

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55. An emulsifier is a substance which

A. Stabilises the emulsion

B. Homogenises the emulsion

C. Coagulates the emulsion

D. Accelerates the dispersion of liquid in liquid

Answer: A

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56. Which of the following constitutes irreversible colloidal system in water as dispersion medium?

A. Clay

B. Platinum

C. $Fe(OH)_3$

D. All of these

Answer: D

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57. Which of the following are favouiorable condition for physical adsorption

A. High pressure

B. Negative AH

C. Higher critical temperature of adsorbate

D. High temperature

Answer: D

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58. Select the correct statement for adsorption process.

A. $\triangle$ S of adsorption process is always +ve

B. $\triangle$ H of adsorption process is -ve

C. $\triangle$ G of adsorption process is always -ve

D. None of the above

Answer: C

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59. Intensity of Brownian movement increases by:

A. with increase in temperature

B. with increase in viscosity of medium

C. increasing particle size

D. None of the above

Answer: A

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60. Which of the following phenomenon is not related to the adsorption on the surface of a substance?

A. Occulsion

B. Heterogeneous catalysis

C. Peptization

D. Flocculation

Answer: D

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61. A gel is converted into a sol by shaking it with a dispersion medium. After some time it again becomes gel.

A. weeping

B. thixotropy

C. syneresis

D. none of these

Answer: B

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62. The minimum concentration of an electrolyte in milimoles per litre required to cause coagulation of a soI is called its :

A. flocculation value

B. protective value

C. gold number

D. critical value

Answer: A

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

A. $V_c / V_s = 10^3$

B. $V_c / V_s = 10^{-3}$

C. $V_c / V_s = 1$

D. $V_c / V_s = 10^{23}$

Answer: B

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64. In Langmuir's model of adsorption of a gas on a solid surface

A. the mass of gas striking a given area of surface is independent of the pressure of the gas

B. the rate of dissociation of adsorbed molecules from the surface does not depend on the surface covered

C. the adsorption at a single site on the surface may involve multiple molecules at the same time.

D. the mass of gas striking a given area of surface is proportional to the pressure of the gas.

Answer: D

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65. Gold number of protective colloids A, B, C and D are 0.50, 0.01, 0.10 and 0.005 respectively. The correct order of their protecting power

A. $B < D < A < C$

B. $D < A < C < B$

C. $C < B < D < A$

D. $A < C < B < D$

Answer: D

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66. Which of the following statements is incorrect regarding physisorption ?

A. Under high pressure, it results into multimolecular layer on adsorbent surface

B. Enthalpy of adsorption $\left(\triangle_{\text{ads}} H \right)$ is low and positive

C. It occurs because of van der Waals forces

D. More easily liquefiable gases are adsorbed readily

Answer: B

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67. According to freundlich adsorption isotherm, which of the following is correct?

A. $(x/m) \propto p^{\circ}$

B. $(x/m) \propto p^{1}$

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

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

Answer: D

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68. The coagulating powers of electrolytes having ions Na^+, Al^{3+} and Ba^{2+} for arsenic sulphides sol increases in the order

A. $Al^{3+} < Ba^{2+} < Na^+$

B. $Na^+ < Ba^{2+} < Al^{3+}$

C. $Ba^{2+} < Na^+ < Al^{3+}$

D. $Al^{3+} < Na^+ < Ba^{2+}$

Answer: B

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69. Which of the following is not correct ?

A. The extent of adsorption depends on the nature of the adsorbent and adsorbate

B. The extent of adsorption depends on the nature of the adsorbent and adsorbate

C. The extent of adsorption depends on the temperature

D. The extent of adsorption has no upper limit

Answer: D

70. Which of the following statements regarding adsorptoin is not true ?

A. The phenomenon of adsorption implies the presence of excess concentration of adsorbate at the surface of adsorbent.

B. The phenomenon of adsorption is due to the presence of residual forces at the surface of the body

C. During adsorption, there occurs a decrease in free energy of the system

D. During adsorption, there occurs an increase in entropy of the system

Answer: D

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71. Which of the followin graphs would yield a straight line plot ?

A. x/m versusp

B. x/m versusp

C. log x/m versus logp

D. x/m versus logp

Answer: C

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72. Which of the following statements is not correct?

A. The, extent of physical adsorption increases linearly with increase in pressure in the low pressure region.

B. The extent physical adsorption attains a limiting value at the high pressure region

C. In the intermediate range of pressure, the increase in adsorption is more than the increase in pressure

D. Physical adsorption involves the reversible process G + S $\underset{\text{desorption}}{\overset{\text{adsorption}}{\longrightarrow}}$ GS where.G S represent, respectively, the unabsorbed gaseous molecules, adsorption sites and adsorbed gaseous molecules.

Answer: C

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73. Which of the following statements is not correct?

A. A colloidal solution is a Heterogeneous two-phase system

B. Silver sol in water is an example of lyophilic sol

C. Metal hydroxides in water are examples of lyophobic sol

D. Liquid-liquid colloidal solution is not stable system

Answer: B

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74. Which of the following colloidal systems represent a gel ?

A. Solid in liquid

B. Solid in gas

C. Liquid in solid

D. Liquid in gas

Answer: C

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75. Which of the following represent multimolecular colloidal particles ?

A. Sol of sulphur

B. Starch

C. Gelatin

D. Proteins

Answer: A

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76. Which of the following statements is correct for lyophilic sols ?

A. The coagulation of the sols is irreversible in nature

B. They are formed by inorganic susbtances

C. They are self stabilised

D. They are readily coagulated by addition of electrolytes

Answer: C

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77. Which of the following sols is negatively charged ?

A. Arsenious sulphide

B. Alurriiniumhydroxide

C. Ferric hydroxide

D. Silver iodide in silvernitrate solution

Answer: A

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78. Which of the following statements is not correct?

A. Peptization is the process by which certain substances are converted into the colloidal state

B. Metal sols of gold, silver and platinum can be prepared by Bredig's arc method

C. Impurities present in a sol makes it more stable

D. Dialysis is a process to remove impurities of ions and molecules from a sol

Answer: C

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79. At isoelectric point,

A. a colloidal particle moves towards cathode during electrophoresis

B. a colloidal particle moves towards anode during electrophoresis

C. a colloidal particle does not move either towards cathode or towards anode during electrophoresis

D. pH of medium becomes 7

Answer: C

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80. The Brownian motion is due to

A. temperature fluctuation within the liquid phase

B. electrostatic interactions between charged particles

C. convection current

D. impact of solvent molecules on the colloidal particles

Answer: D

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81. Tyndall effect is due to

A. scattering of light by colloidal particles

B. scattering of light by colloidal particles

C. refraction of light by colloidal particl

D. adsorption of light by colloidal particles

Answer: A

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82. Among the following, the surfactant that will form micelles in aqueous solution at the lowest molar concentration at ambient conditions 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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83. Among the electrolytes $Na_2SO_4, CaCI_2, AI_2(SO_4)_3$ and NH_4CI the most effective coagulating agent for Sb_2S_3 sol is:

A. Na_2S0_4

B. $CaCl_2$

C. $AI_2(S0_4)_3$

D. NH_4CI

Answer: C

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84. The volume of gases H_2, CH_4, CO_2 and NH_3 adsorbed by 1 g of charcaoal at 288 K are in the order

A. $H_2 > CH_4 > C0_2 > NH_3$

B. $CH_4 > C0_2 > NH_3 > H_2$

C. $CO_2 > NH_3 > H_2 > CH_4$

D. $NH_3 > CO_2 > CH_4 > H_2$

Answer: D

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85. Which one of the following is not the example of homogeneous catalysis?

A. Formation of $S0_3$ in the chamber process

B. Formation of $S0_3$ in the contact process

C. Hydrolysis of an ester in presence of acid

D. Decomposition of $KCI0_3$ in presence of $Mn0_2$

Answer: B

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86. TEL minimizes the knocking effect when mixed with petrol. It acts as

A. Positive catalyst

B. Negative catalyst

C. Negative catalyst

D. Induced catalyst

Answer: B

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87. Which statement is wrong?

A. Haber process of NH_3 requires iron as catalyst

B. Friedel craft reaction require anhydrous $AICI_3$

C. Hydrogenation of oils requires iron as catalyst

D. Oxidation of $S0_2$ to $S0_3$ requires V_20_5 .

Answer: C

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

A. Protective action

B. Coagulation

C. Peptisation

D. Dialysis

Answer: C

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89. Bleeding is stopped by application of ferric chloride. This is because

A. The blood starts flowing in opposite direction

B. The ferric chloride seals the blood vessel

C. The blood reacts and forms a solid which seals the blood vessel

D. The blood is coagulated and thus, the blood vessel is sealed.

Answer: D

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90. On addition of one mL solution of 10% NaCl to 10 ml. gold sol in presence of 0.0025 g of starch, the coagulation is just prevented. The gold number of starch is

A. 25

B. 2.5

C. 0.25

D. 0.025

Answer: B

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91. Select correct statement (s):

A. Hydrophilic colloid is a colloid in which there is a strong attraction between the dispersed phase, and water

B. Hydrophobic colloid is a colloid in which there is a lack of attraction between the dispersed phase and water

C. Hydrophobic colloid is a colloid in which there is a lack of attraction between the dispersed phase and water

D. All of the above

Answer: D

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92. Catalytic poisoning is due to:

A. increase in activation energy

B. adsorption of poison on the reactants surface

C. adsorption of poison on the catalyst surface

D. increase in heat of reaction

Answer: C

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93. Which is not correct about the reaction?

$$RCOCI + H_2 \xrightarrow[pd-BaS0_4]{} RCHO + HCI$$

A. Pd acts aspositive catalyst

B. It is Rosenmunds reaction

C. $BaS0_4$ acts as poison for Pd

D. $BaS0_4$ acts as promoter for Pd

Answer: D

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94. Setting of cement involves formation of:

A. gel

B. emulsion

C. sol

D. solid aerosol

Answer: A

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95. Identify the correct statement regarding enzymes:

A. Enzymes are specific biological catalysts and their action is independent of pH

B. Enzymes are normally homogeneous catalyst that are very specific in their action

C. Enzymes are specific biological catalyst that cannot be poisoned

D. Enzymes are specific biological catalysts that can normally function at very high temperature (T=1000 K)

Answer: B

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96. Bredig's arc method involves:

A. dispersion

B. condensation

C. peptization

D. dispersion and condensation both

Answer: D

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97. A negatively charged sol will require minimum amount of which electrolyte for its coagulation?

A. $NaN0_3$

B. $Mg(N0_3)_2$

C. $AI(N0_3)_3$

D. $TH(N0_3)_4$

Answer: D

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98. In multimolecular colloidal sol, atoms or molecules are held together by

A. H-bonding

B. van der Waals' forces

C. ionic bonding

D. covalent bonding

Answer: B

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99. Rate of physisosrption increases with:

A. decrease in temperature

B. decrease in temperature

C. decrease in pressure

D. decrease in surface area

Answer: A

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100. Adsorption of gases on solid surface is generally exothermic because:

A. enthjapy is positive

B. entropy decreases

C. entropy increases

D. free energy increases

Answer: B

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Level Ii

1. Which of the following statements is not correct?

A. Zeolite contains aluminosilicate framework

B. The general formula of zeolite is

$$M_{x/n}^{n+}\left[(AlO_2)_x(SiO_2)_y\right]^{x-}.zH_2O$$

C. Zeolites are characterized by their open structures that permit the exchange of anions and water molecules

D. Sodalite cage is formed by linking $24SiO_4$ tetrahedra

Answer: C

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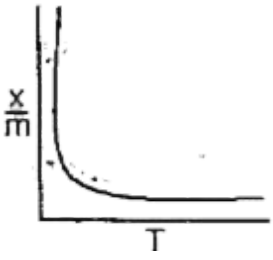
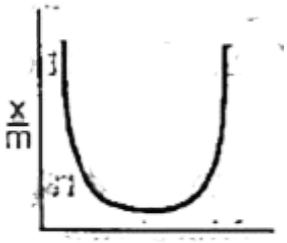
2. Which plot is the adsorption isobar for chemisorptions ?

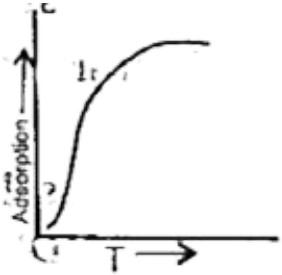
A.



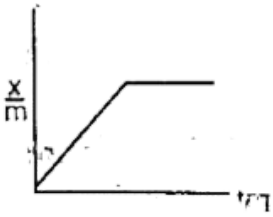
B.



C.



D.



Answer: C

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3. Which of the following properties are related to physical adsorption ?

I Reversible

II Formation of unimoleuclar layer

III Low heat of adsorption

IV Occurs at low temperature and decreases with increasing temperature.

A. I,II,III

B. I,III,IV

C. II,III,IV

D. I,III

Answer: B

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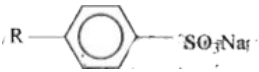
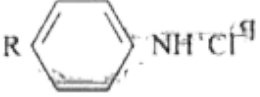
4. Non -electrolytic colloidal surfactant is :

A. $C_{17}H_{35}COONa$

B. 

C. $C_nH_{2n+1}(OCH_2CH_2)_x.OH$

D. 

Answer: C

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5. 50 ml of 1 M oxalic acid is shaken with 0.5 g of wood charcoal : The final concentration of the solution after adsorption is 0.5 M. Amount of hydrated oxalic acid adsorbed per gram of charcoal is

A. 3.45 g

B. 3.15 g

C. 6.30 g

D. 6.45 g

Answer: C

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6. Which of the following statements is incorrect ?

A. Colloidal gold is used for intramuscular injection

B. Collodial solution of latex is used in preparation of rubber

C. Photographic films are prepared by coating an emulsion of AgBr in gelatin over glass plate

D. Tanning used in leather industry contains positively charged colloidal particles.

Answer: D

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7. Which of the following will show Tyndall effect ?

A. Aqueous solution of soap below critical micelle concentration

B. Aqueous solution of soap above critical micelle concentration

C. Aqueous solution of sodium chloride

D. Aqueous solution of sugar

Answer: B

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8. At the Critical Micelle Concentration (CMC) the surfactant molecules

A. decompose

B. dissociate

C. associate

D. become completely soluble

Answer: C

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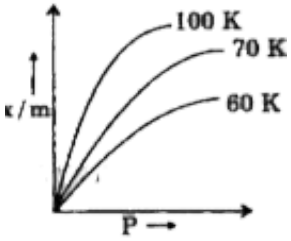
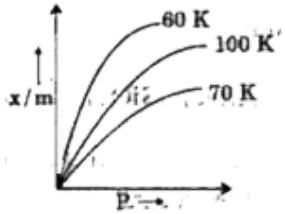
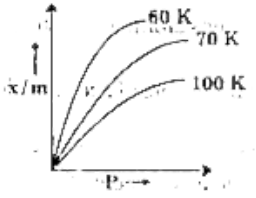
9. During adsorption of a gas on solid surface (Freundlich adorption isotherm) select the correct variation on extent of adsorption (x/m) with P (Pressure) at different temperature.



A.



B.



C.

D.

Answer: C

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10. Select the correct statements.

A. Zeta potential is the potential needed for electrophoresis

B. During electrophoresis, colloidal particle in As_(2)S_(3)solution move towards anode

C. During electroosmosis, dispersed phase move towards oppositely charged electrode on application o electric field

D. Tyndall effect can be shown by true solution

Answer: B

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11. The protective power of lyophilic sol is:

A. dependent on the size of colloidal particles

B. expressed in terms of gold number

C. expressed byx/m

D. directly proportional to the magnitude of charge on it

Answer: B

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12. 2.0 g of charcoal is placed in 100 mL of 0.5 M CH_3COOH to form an adsorbed mono-acidic layer of acetic acid molecules and thereby the molarity of CH_3 COOH reduces to 0.49. The surface area of charcoal is $3 \times 10^2 m^2 g^{-1}$. The surface area of charcoal adsorbed by each molecule of acetic acid is

A. $1.0 \times 10^{-18} m^2$

B. $1.0 \times 10^{-19} m^2$

C. $1.0 \times 10^3 m^2$

D. 1.0×10^{-22} m

Answer: A

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13. A catalyst lowered the activation energy by $25kJmol^{-1}$ at $25^{\circ}C$. By how many times will the rate grow?

A. 14069

B. 24069

C. 16049

D. 19049

Answer: B

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14. For the coagulation of 10 mL of $Fe(OH)_3$ sol, 2 mL of 1 MKBr is required. What is the coagulating value of KBr?

A. 100

B. 150

C. 200

D. 250

Answer: C

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15. Which is not the characteristic of hydrophobic sols?

A. They are highly susceptible to coagulation by addition of electrolytes

B. The have nearly the same surface tension and viscosity as that of dispersion medium

C. Their stability is due to both electric charge and solvation of the particles

D. Sol particles can be seen under ultramicroscope

Answer: C

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

A. $NaCl > Na_2SO_4 > Na_3PO_4$

B. $Na_2SO_4 > Na_3PO_4 > NaCl$

C. $Na_3PO_4 > Na_2SO_4 > NaCl$

D. $Na_2SO_4 > NaCl > Na_3PO_4$

Answer: A

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

A. 2.5

B. 1.2

C. 3.1

D. 1

Answer: D

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18. The volume of nitrogen gas Vm (at STP) required to cover a sample of silica gel with a mono-molecular layer is $129 cm^2 g^{-1}$ of gel. Calculate the

surface area per gram of the gel if each nitrogen molecule occupies $16.23 \times 10^{-20} m^2$

A. 562.6

B. 461.8

C. 831.6

D. 941.8

Answer: A

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19. Which of the following is true with respect to 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: B

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20. The plot of log(x/m) (alongy-axis) vs. log C(along x-axis) in the Freundlich adsorption isotherm is a horizontal line parallel to x-axis when

A. n=0

B. n=1

C. $n = \infty$

D. Such a plot is impossible

Answer: C

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21. 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 m mol

B. 0.15 mg

C. 1.5 m mol

D. 1.5 mg

Answer: D

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22. A catalyst added to a reversible reaction.

A. changes the position of equilibrium

B. increases the concentration of products

C. increase the equilibrium constant

D. speeds up both forward and backward reactions

Answer: D

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23. A white precipitate of $Sn(OH)_4$ is peptized with dilute HCl. The sol particle will carry

A. positive charge

B. negative charge

C. sometimes positive and sometimes negative charge

D. no charge

Answer: A

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

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

B. At 83 K, there is fondation 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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25. Coagulating value is expressed in terms of

A. millimol L^{-1}

B. mol L^{-1}

C. gL^{-1}

D. mol mL^{-1}

Answer: A

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26. Blue colour of sea is due to

A. refraction of blue light by impurities in sea water

B. refraction of blue sky by water

C. scattering of light by water

D. none of these

Answer: C

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27. Equal volume each of two sols of AgI, one obtained by adding $AgNO_3$ to slight excess of KI and another obtained by adding KI to slight excess of $AgNO_3$ are mixed together. Then

A. the two sols will stabilize each other

B. the sol particles will acquire more electric charge

C. the sols will coagulate each other mutually

D. a true solution will be obtained

Answer: C

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28. During electro-osmosis of $Fe(OH)_3$ sol:

A. sol particles move towards anode

B. sol particles move towards cathode

C. the dispersion medium moves towards anode

D. the dispersion medium moves towards cathode

Answer: C

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29. For the coagulation of 50 ml of ferric hydroxide sol. 10 mL of 0.5 MKCl is required. What is the coagulation value of KCI?

A. 5

B. 10

C. 100

D. 50

Answer: C

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30. A detergent $\left(C_{12}H_{23}SO_4^-Na^+\right)$ solution becomes a colloidal sol at a concentration of 10^{-3} M.On an average 10^{13} colloidal particles are present in $1mm^3$ What is the average number of ions are contain in one colloidal particle (micelle)?

[Given : $N_A = 6 \times 10^{23}$]

A. 6×10^7

B. 10

C. 60

D. 40

Answer: C

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31. One gram of activated carbon has a surface area of 1000 m. Considering complete coverage as well as monomolecular adsorption, how much ammonia at 1 atm and 273 K would be adsorbed on the

surface of $\frac{44}{7}g$ carbon if radius of a ammonia molecules is $10^{-8}cm$. [Given , $N_A = 6 \times 10^{23}$]

A. 7.46 L

B. 0.33 L

C. 44.8 L

D. 23.5 L

Answer: A

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32. At 1 atm and 273 K the volume of nitrogen gas required to cover a sample of silica gel, assuming Langinuin monolayer adsorption, is found to be $1.30cm^3g^{-1}$ of the gel. The area occupied by a nitrogen molecule is $0.16nm^2$. What is the surface area per gram of silica gel?

[Given : $N_A = 6 \times 10^{23}$]

A. 5.568 m^2g^{-1}

B. $3.48m^2g^{-1}$

C. $1.6m^2g^{-1}$

D. $2.72m^2g^{-1}$

Answer: A

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33. 10% sites of catalyst bed have adsorbed by H_2. On heating H_2 gas is evolved from sites and collectedat 0.03 atm and 300 K in a small vessel of 2.46 cm^3. No. of sites available is 5.4×10^{16} per cm^2 and surfacearea is 1000 cm^2. Find out the no. of surface sites occupied per molecule of H_2: $\left[\text{Given} N_A = 6 \times 10^{23}\right]$

A. 1

B. 2

C. 3

D. 4

Answer: C

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34. A sample of 16 g charcoal was brought into contact with CH gas contained in a vessel of 1 litre at $27^\circ C$. The. pressure of gas was found to fall from 760 to 608 torr. The density of charcoal sample is $1.6g/cm^3$. What is the volume of the CH_4 gas adsorbed per gram of the adsorbentat 608 torr and $27^\circ C$?

A. 125 mL/g

B. 16.25mL/g

C. 26mL/g

D. 82.5mL/g

Answer: B

Watch Video Solution

35. The addition of alcohol to a saturated aqueous solution of calcium acetate first forms a sol and then sets to a gelatinous mass called solid alcohol which is a

A. solid sol

B. aerosol

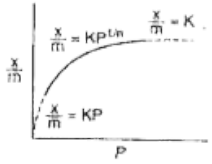
C. solid form

D. gel

Answer: D

Watch Video Solution

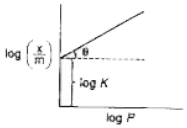
36. Which one is not correct about Freundlich isotherm ?



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

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

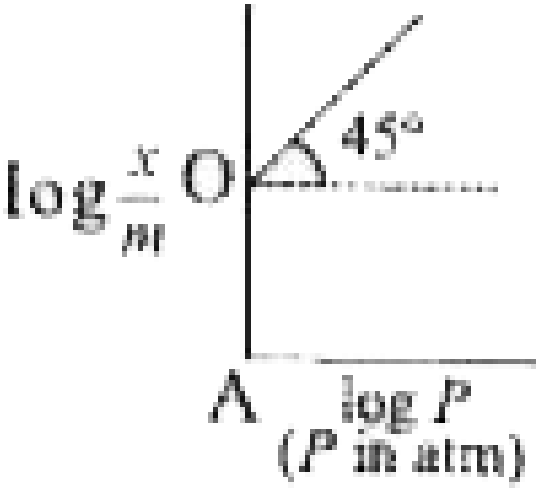
C. $\theta = 45^\circ$ at high pressure

D. 

Answer: C

Watch Video Solution

37. A graph plotted log $\frac{x}{m}$ vs. log P is shown in figure given below



If intercept is equal to log 3, then value of $\frac{x}{m}$ at a pressure of 3 atm

A. 2

B. 9

C. 6

D. 8

Answer: B

Watch Video Solution

38. 50 mL of 0.3 Macetic acid is shaken with 5 g activated charcoal. The concentration of acetic acid is reduced to 1/3 of original molarity. The mass of acetic acid adsorbed per g of charcoal

A. $2 \times 10^{-4} g$

B. 0.12 g

C. $2 \times 10^{-2} g$

D. $3 \times 10^{-2} g$

Answer: B

Watch Video Solution

39. 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

A. 1.9×10^{12}

B. 6.3×10^{14}

C. 6.3×10^{10}

D. 2.4×10^{6}

Answer: D

Watch Video Solution

40. Pick out the wrong statement:

A. Micelles are formed by surfactant molecules above the CMC

B. The conductivity of a solution having surfactant molecules decreases sharply at the CMC

C. Lower is the CMC of detergent, more is its detergency

D. Cleansing action is not related to micelle.

Answer: D

Watch Video Solution

41. A cationic colloidal electrolyte forms micelle at 10^{-4} M concentration in water. If $1mm^3$ solution contains 10^{12} micelle structure, then the no. of cations involved in one micelle are:

A. 20

B. 40

C. 60

D. 80

Answer: C

Watch Video Solution

42. A 1 litre vessel having 20 g charcoal (density $2.0\frac{g}{c}m^3$) was filled with a gas at 300K. The pressure of the gas was 760 torr. Due to adsorption, the pressure of gas falls to 608 torr. What is the no. of gas molecules adsorbed perg of charcoal?

A. 2.4×10^{21}

B. 2.4×10^{20}

C. 2.4×10^{22}

D. 2.4×10^{23}

Answer: B

Watch Video Solution

43. Which of the following cannot be used to prepare an emulsion of benzene in water?

A. 

B. 

C. 

D. $(CH_3)_4\overset{+}{N}Br^-$

Answer: D

Watch Video Solution

44. If the dispersed phases in colloidal iron (III) hydroxide and colloidal gold are positively and negatively charged respectively, which of the following statements is not correct?

A. Magnesium chloride solution coagulates gold sol readily than iron (III) hydroxide sol

B. Sodium sulphate solution causes coagulation in both sol

C. Mixing of the two sols has no effect

D. Coagulation in both sols can be brought about by electrophoresis

Answer: C

Watch Video Solution

45. Methylene blue, from its aqueous solution, is adsorbed on activated charcoal at $25^{\circ} C$. For this process, the correct statement is:

A. The adsorption requires activation at $25^{\circ} C$

B. The adsorption is accompanied by a decrease in enthalpy

C. The adsorption increases with increase of temperature

D. The adsorption is irreversible

Answer: B

Watch Video Solution

46. Which of the following is a mistmatch: .

A. Lyophilic colloids - reversible sols

B. Associated colloids - micelles

C. Tyndall effect - scattering of light by colloidal particle

D. Electrophoresis - movement of dispersion medium under the infulence of electric field

Answer: D

Watch Video Solution

47. A negative catalyst will

A. raise the energy of activation for a given reaction

B. take away the internal energy of reactants and deactivate them

C. catalyse the backward reaction more than the forward one, thereby shifting equilibrium backward.

D. none of these

Answer: A

Watch Video Solution

48. A liquid is found to scatter a beam of light without leaving any residue when passed through the filter paper. The liquid can be described as

A. a suspension

B. Oil

C. a colloidal sol

D. a true solution

Answer: C

Watch Video Solution

49. Which of the following statements is not correct?

A. Zeolite contains aluminosilicate framework

B. The general formula of zeolite'is

$$M_{x/n}^{n+}\left[(AI0_2)_x(Si0_2)_y\right]^{x-}.zH_2O$$

C. Zeolites are characterized by their open structures that permit the exchange of anions and water molecules

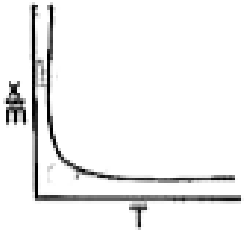
D. Sodalite cage is formed by linking 24 $Si0_4$ tetrahedra

Answer: C

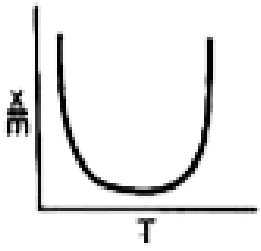
Watch Video Solution

50. Which plot is the adsorption isobar for chemisorptions ?

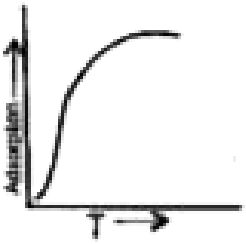
A.



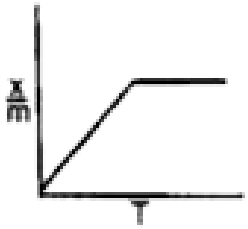
B.



C.



D.



Answer: C

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51. Which of the following properties are related to physical adsorption ?

I Reversible

II Formation of unimoleuclar layer

III Low heat of adsorption

IV Occurs at low temperature and decreases with increasing temperature.

A. I,II,III

B. I,III,IV

C. II,III,IV

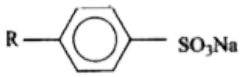
D. I,III

Answer: B

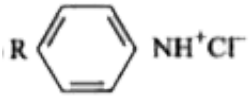
Watch Video Solution

52. Non -electrolytic colloidal surfactant is :

A. $C_{17}H_{35}COONa$

B. 

C. $C_nH_{2n+1}, (OCH_2CH_2)_x . OH$

D. 

Answer: C

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53. 50 ml of 1 M oxalic acid is shaken with 0.5 g of wood charcoal : The final concentration of the solution after adsorption is 0.5 M. Amount of hydrated oxalic acid adsorbed per gram of charcoal is

A. 3.45 g

B. 3.15 g

C. 6.30 g

D. 6.45 g

Answer: C

Watch Video Solution

54. Which of the,following statements is incorrect? Colloidal gold is used for intramuscular injection, Colloidal solution of latex is used in preparation of rubber, Colloidal solution of latex is used in preparation of rubber, Tannin used in leather industry contains positively charged colloidal particles

A. Colloidal gold is used for intramuscular injection

B. Colloidal solution of latex is used in preparation of rubber

C. Colloidal solution of latex is used in preparation of rubber

D. Tannin used in leather industry contains positively charged colloidal particles

Answer: D

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55. Which of the following will show Tyndall effect ?

A. Aqueous solution of soap below critical micelle concentration

B. Aqueous solution of soap below critical micelle concentration

C. Aqueous solution of sodium chloride

D. Aqueous solution of sugar

Answer: B

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56. At the Critical Micelle Concentration (CMC) the surfactant molecules

A. decompose

B. dissociate

C. associate

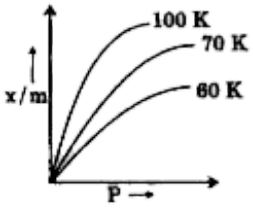
D. becomecompletelysoluble

Answer: C

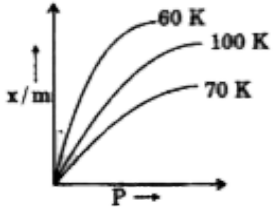
Watch Video Solution

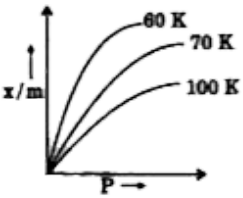
57. During adsorption of a gas on solid surface (Freundlich adorption isotherm) select the correct variation on extent of adsorption (x/m) with P (Pressure) at different temperature.

A.



B.





C.

D. None of above

Answer: C

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58. Select the correct statements. : Zeta potential is the potential needed for electrophoresis, During electrophoresis, colloidal particle in $As2S3$ solution move towards anode, During electroosmosis, dispersed phase move towards oppositely charged electrode on application of electric field, Tyndall effect can be shown by true solution

A. Zeta potential is the potential needed for electrophoresis

B. During electrophoresis, colloidal particle in As_2S_3 solution move towards anode

C. During electroosmosis, dispersed phase move towards oppositely charged electrode on application of electric field

D. Tyndall effect can be shown by true solution

Answer: B

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59. The protective power of lyophilic sol is:

A. dependent on the size of colloidal particles

B. expressed in terms of gold number

C. expressed by x/m

D. directly proportional to the magnitude of charge on it

Answer: B

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60. 2.0 g of charcoal is placed in 100 mL of 0.5 M CH_3COOH to form an adsorbed mono-acidic layer of acetic acid molecules and thereby the molarity of CH_3 COOH reduces to 0.49. The surface area of charcoal is $3 \times 10^2 m^2 g^{-1}$. The surface area of charcoal adsorbed by each molecule of acetic acid is

A. $1.0 \times 10^{-18} m^2$

B. $1.0 \times 10^{-19} m^2$

C. $1.0 \times 10^{13} m^2$

D. 1.0×10^{22} m

Answer: A

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61. A catalyst lowered the activation energy by $25 kJ mol^{-1}$ at $25^\circ C$. By how many times will the rate grow?

A. 14069

B. 24069

C. 16049

D. 19049

Answer: B

Watch Video Solution

62. For the coagulation of 10 mL of $Fe(OH)_3$ sol, 2 mL of 1 MKBr is required. What is the coagulating value of KBr?

A. 100

B. 150

C. 200

D. 250

Answer: C

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63. Which is not the characteristic of hydrophobic sols?

A. They are highly susceptible to coagulation by addition of electrolytes

B. The have nearly the same surface tension and viscosity as that of dispersion medium

C. Their stability is due to both electric charge and solvation of the particles

D. Sol particles can be seen under ultramicroscope

Answer: C

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

A. $NaCl > Na_2S0_4 > Na_3P0_4$

B. $Na_2SO_4 > Na_3O_4 > NaCl$

C. $Na_3P0_4 > Na_2S0_4 > NaCl$

D. $Na_2SO_4 > NaCl > Na_3P0_4$

Answer: A

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

A. 2.5

B. 1.2

C. 3.1

D. 1

Answer: D

Watch Video Solution

66. The volume of nitrogen gas Vm (at STP) required to cover a sample of silica gel with a mono-molecular layer is $129 cm^2 g^{-1}$ of gel. Calculate the surface area per gram of the gel if each nitrogen molecule occupies $16.23 \times 10^{-20} m^2$

A. 562.6

B. 461.8

C. 831.6

D. 941.8

Answer: A

Watch Video Solution

67. Which of the following is true with respect to adsorption ?

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

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

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

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

Answer: B

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68. The plot of log(x/m) (alongy-axis) vs. log C(along x-axis) in the Freundlich adsorption isotherm is a horizontal line parallel to x-axis when

A. n=0

B. n=1

C. $n = \infty$

D. Such a plot is impossible

Answer: C

Watch Video Solution

69. 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. 0.15m mol

B. 0.15mg

C. 1.5m mol

D. 1.5mg

Answer: D

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70. A catalyst added to a reversible reaction.

A. changes the position of equilibrium

B. increases the concentration of products

C. increase the equilibrium constant

D. speeds up both forward and backward reactions

Answer: D

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71. A white precipitate of $Sn(OH)_4$ is peptized with dilute HCl. The sol particle will carry

A. positive charge

B. positive charge

C. sometimes positive and sometimes negative charge

D. no charge

Answer: A

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72. Although nitrogen does not adsorb on iron surface at room temperature, it adsorbs on the same surface at 83 K. Which one of the following statement 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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73. Coagulating value is expressed in terms of

A. milli mol L^{-1}

B. mol L^{-1}

C. gL^{-1}

D. mol mL^{-1}

Answer: A

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74. Blue colour of sea is due to

A. refraction of blue light by impurities in sea water

B. refraction of blue sky by water

C. refraction of blue sky by water

D. none of these

Answer: C

Watch Video Solution

75. Equal volume each of two sols of Agl, one obtained by adding $AgNO_3$ to slight excess of Kland another obtained by adding KI to slight excess of $AgNO_3$ are mixed together. Then

A. the two sols will stabilize each other

B. the sol particles will acquire more electric charge

C. the sols will coagulate each other mutually

D. a true solution will be obtained

Answer: C

Watch Video Solution

76. During electro-osmosis of $Fe(OH)_3$ sol:

A. sol particles move towards anode

B. sol particles move towards anode

C. the dispersion medium moves towards anode

D. the dispersion medium moves towards cathode

Answer: C

Watch Video Solution

77. For the coagulation of 50 ml of ferric hydroxide sol. 10 mL of 0.5 MKCl is required. What is the coagulation value of KCl?

A. 5

B. 10

C. 100

D. 50

Answer: C

Watch Video Solution

78. A detergent $\left(C_{12}H_{23}SO_4^-Na^+\right)$ solution becomes a colloidal sol at a concentration of 10^{-3} M.On an average 10^{13} colloidal particles are present in $1mm^3$ What is the average number of ions are contain in one colloidal particle (micelle)?

[Given : $N_A = 6 \times 10^{23}$]

A. 6×10^7

B. 10

C. 60

D. 40

Answer: C

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79. One gram of activated carbon has a surface area of 1000 m. Considering complete coverage as well as monomolecular adsorption, how much ammonia at 1 atm and 273 K would be adsorbed on the surface of $\frac{44}{7}g$ carbon if radius of a ammonia molecules is $10^{-8}cm$. $[\text{Given}, \ N_A = 6 \times 10^{23}]$

A. 7.46 L

B. 0.33L

C. 44.8 L

D. 23.5L

Answer: A

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80. At 1 atm and 273 K the volume of nitrogen gas required to cover a sample of silica gel, assuming Langinuin monolayer adsorption, is found to be $1.30 cm^3 g^{-1}$ of the gel. The area occupied by a nitrogen molecule is $0.16 nm^2$. What is the surface area per gram of silica gel?

[Given : $N_A = 6 \times 10^{23}$]

A. 5.568 $m^2 g^{-1}$

B. 3.48 $m^2 g^{-1}$

C. 1.6 $m^2 g^{-1}$

D. 2.72 $m^2 g^{-1}$

Answer: A

Watch Video Solution

81. 10% sites of catalyst bed have adsorbed by H_2. On heating H_2 gas is evolved from sites and collectedat 0.03 atm and 300 K in a small vessel of 2.46 cm^3. No. of sites available is 5.4×10^{16} per cm^2 and surfacearea is 1000 cm^2. Find out the no. of surface sites occupied per molecule of H_2: $\left[\text{Given} N_A = 6 \times 10^{23}\right]$

A. 1

B. 2

C. 3

D. 4

Answer: C

Watch Video Solution

82. A sample of 16 g charcoal was brought into contact with CH gas contained in a vessel of 1 litre at $27^{\circ}C$. The. pressure of gas was found to fall from 760 to 608 torr. The density of charcoal sample is $1.6g/cm^3$. What is the volume of the CH_4 gas adsorbed per gram of the adsorbentat 608 torr and $27^{\circ}C$?

A. 125 mL/g

B. 16.25 mL/g

C. 26 mL/g

D. 82.5 mL/g

Answer: B

Watch Video Solution

83. The addition of alcohol to a saturated aqueous solution of calcium acetate first forms a sol and then sets to a gelatinous mass called solid alcohol which is a

A. solid sol

B. aerosol

C. solid form

D. gel

Answer: D

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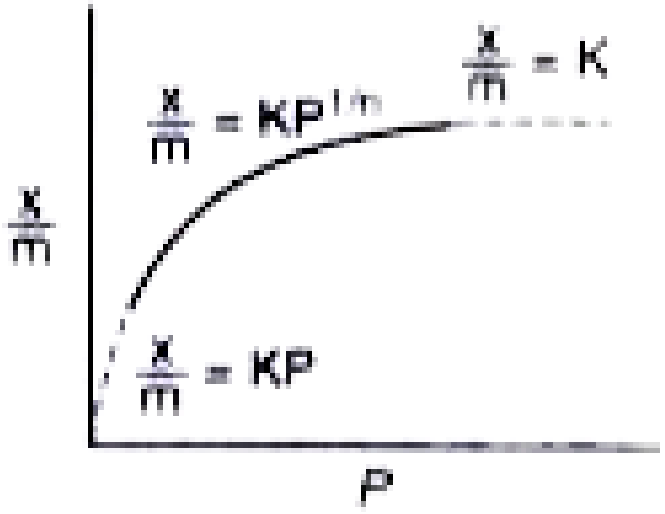
84. Which one is not correct about Freundlich isotherm if?



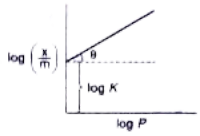
: $n = \frac{1}{\tan\theta}$

at average pressure, $\theta = 45^\circ$ at low pressure , $\theta = 45^\circ$ at high pressure

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

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

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

D. 

Answer: C

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85. A graph plotted between log $\frac{x}{m}$ vs log p is

If intercept is equl to log then value of $\frac{x}{m}$ at a pressure of 3 atm : 2, 9, 6, 8

A. 2

B. 9

C. 6

D. 8

Answer: B

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86. 50 mL of 0.3 Macetic acid is shaken with 5 g activated charcoal. The concentration of acetic acid is reduced to 1/3 of original molarity. The mass of acetic acid adsorbed per g of charcoal

A. 2×10^{-4} g

B. 0.12g

C. 2×10^{-2} g

D. $3 \times l0^{-2}$ g

Answer: B

Watch Video Solution

87. 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

A. 1.9×10^{12}

B. 6.3×10^{14}

C. 6.3×10^{10}

D. 2.4×10^{6}

Answer: D

Watch Video Solution

88. Pick out the wrong statement: Micelles are formed by surfactant molecules above the CMC, The conductivity of a solution having surfactant molecules decreases sharply at the CMC, Lower is the CMC of

detergent, more is its detergency, Cleansing action is not related to micelle.

A. Micelles are formed by surfactant molecules above the CMC

B. The conductivity of a solution having surfactant molecules decreases sharply at the CMC

C. Lower is the CMC of detergent, more is its detergency

D. Cleansing action is not related to micelle.

Answer: D

Watch Video Solution

89. A cationic colloidal electrolyte forms micelle at 10^{-4} M concentration in water. If $1mm^3$ solution contains 10^{12} micelle structure, then the no. of cations involved in one micelle are:

A. 20

B. 40

C. 60

D. 80

Answer: C

Watch Video Solution

90. A 1 litre vessel having 20 g charcoal (density $2.0\frac{g}{c}m^3$) was filled with a gas at 300K. The pressure of the gas was 760 torr. Due to adsorption, the pressure of gas falls to 608 torr. What is the no. of gas molecules adsorbed perg of charcoal?

A. 2.4×10^{21}

B. 2.4×10^{20}

C. 2.4×10^{22}

D. 2.4×10^{23}

Answer: B

Watch Video Solution

91. Which of the following cannot be used to prepare an emulsion of benzene in water?

A. 

B. 

C. 

D. $(CH_3)_4N^+Br^-$

Answer: D

Watch Video Solution

92. If the dispersed phases in colloidal iron (III) hydroxide and colloidal gold are positively and negatively charged respectively, which of the

following statements is not correct?

A. Magnesium chloride solution coagulates gold sol readily than iron (III) hydroxide sol

B. Sodium sulphate solution causes coagulation in both sol

C. Mixing of the two sols has no effect

D. Coagulation in both sols can be brought about by electrophoresis

Answer: C

Watch Video Solution

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A. The adsorption requires activation at 25° C

B. The adsorption is accompanied by a decrease in enthalpy

C. The adsorption increases with increase of temperature

D. The adsorption is irreversible

Answer: B

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94. Which of the following is a mistmatch: .

A. Lyophilic colloids - reversible sols

B. Associated colloids - micelles

C. Tyndall effect - scattering of light by colloidal particle

D. Electrophoresis - movement of dispersion medium under the influence of electric field

Answer: D

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95. A negative catalyst will

A. raise the energy of activation for a given reaction

B. raise the energy of activation for a given reaction

C. catalyse the backward reaction more than the forward one, thereby shifting equilibrium backward.

D. none of these

Answer: A

Watch Video Solution

96. A liquid is found to scatter a beam of light without leaving any residue when passed through the filter paper. The liquid can be described as

A. asuspension

B. Oil

C. a colloidal sol

D. a true solution

Answer: C

Watch Video Solution

97. Assertion : Fe^{3+} can be used for coagulationof As_2S_3 sol. Reason : Fe^{3+} reacts with As_2S_3 to give Fe_2S_3 .

A. If both (A) and (R) are correct, and (R) is the correct explanation of (A)

B. If both (A) and (R) are correct, but (R) is not the correct explanation of (A)

C. If (A) is correct, but (R) is incorrect

D. If (A) is incorrect, but (R) is correct

Answer: C

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98. Statement 1 : The micelle formed by sodium stearate in water has $-COO^{\Theta}$ groups at the surface.

Statement 2 : Surface tension of water is reduced by addition of stearate.

A. If both (A) and (R) are correct, and (R) is the correct explanation of (A)

B. If both (A) and (R) are correct, but (R) is not the correct explanation of (A)

C. If (A) is correct, but (R) is incorrect

D. If (A) is incorrect, but (R) is correct

Answer: A

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99. Assertion : The mass of nickel catalyst recovered after being used in the-hydrogenation of an oil is less than the mass of nickel added to the reaction.Reason : Catalyst take part in the reaction but are recovered in the end. : If both (A) and (R) are correct, and (R) is the correct explanation of (A); If both (A) and (R) are correct, but (R) is not the correct explanation of (A); If (A) is correct, but (R) is incorrect; If (A) is incorrect, but (R) is correct

A. If both (A) and (R) are correct, and (R) is the correct explanation of (A)

B. If both (A) and (R) are correct, but (R) is not the correct explanation of (A)

C. If (A) is correct, but (R) is incorrect

D. If (A) is incorrect, but (R) is correct

Answer: B

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100. Assertion : Hydrolysis of ethyl acetate in the presence of acid is a reaction of first order whereas in presence of alkali, it is reaction of second order. Reason : Acid only acts as a catalyst whereas alkali acts as one of the reactants.

A. If both (A) and (R) are correct, and (R) is the correct explanation of (A)

B. If both (A) and (R) are correct, but (R) is not the correct explanation of (A)

C. If (A) is correct, but (R) is incorrect

D. If (A) is incorrect, but (R) is correct

Answer: A

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101. Assertion : The property of adsorption is shown by solids to a much larger extent than liquids. Reason : Solids, particularly when finely divided, have a large surface area.

A. If both (A) and (R) are correct, and (R) is the correct explanation of (A)

B. If both (A) and (R) are correct, but (R) is not the correct explanation of (A)

C. If (A) is correct, but (R) is incorrect

D. If (A) is incorrect, but (R) is correct

Answer: A

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102. Assertion : Collodial sols scatter light while true solutions do not. Reason : The particles in the collodial sol move much slower than that of the true solution.

A. If both (A) and (R) are correct, and (R) is the correct explanation of (A)

B. If both (A) and (R) are correct, but (R) is not the correct explanation of (A)

C. If (A) is correct, but (R) is incorrect

D. If (A) is incorrect, but (R) is correct

Answer: B

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103. Statement 1 : According to Freundlich : $\frac{x}{m} = K_{.p}^{1/n}$

Statement 2 : The isotherm shows variation of the amount of gas adsorbent with temperature.

A. If both (A) and (R) are correct, and (R) is the correct explanation of (A)

B. If both (A) and (R) are correct, but (R) is not the correct explanation of (A)

C. If (A) is correct, but (R) is incorrect

D. If (A) is incorrect, but (R) is correct

Answer: C

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104. Assertion : Lyophilic colloids are called as reversible sols. Reason : Lyophilic sols are liquid loving. : If both (A) and (R) are correct, and (R) is the correct explanation of (A), If both (A) and (R) are correct, but (R) is not the correct explanation of (A), If (A) is correct, but (R) is incorrect, If (A) is incorrect, but (R) is correct

A. If both (A) and (R) are correct, and (R) is the correct explanation of (A)

B. If both (A) and (R) are correct, but (R) is not the correct explanation of (A)

C. If (A) is correct, but (R) is incorrect

D. If (A) is incorrect, but (R) is correct

Answer: A

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105. Assertion : Colloidal solution is electrically neutral. Reason : Due to similar nature of the charge carried by the particles, they repel each other and do not combine to form bigger particles.

A. If both (A) and (R) are correct, and (R) is the correct explanation of (A)

B. If both (A) and (R) are correct, but (R) is not the correct explanation of (A)

C. If (A) is correct, but (R) is incorrect

D. If (A) is incorrect, but (R) is correct

Answer: B

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106. Assertion : For the coagulation of sols carrying positive charege PO_4^{3-} ions are more efficient than SO_4^{2-} or CI^- ions Reason : This follows Hardy schulze rule

A. If both (A) and (R) are correct, and (R) is the correct explanation of (A)

B. If both (A) and (R) are correct, but (R) is not the correct explanation of (A)

C. If (A) is correct, but (R) is incorrect

D. If (A) is incorrect, but (R) is correct

Answer: A

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107. Assertion :In physical adsorption, enthalpy of adsorption is very low. Reason: In physical adsorption, attraction between gas molecules and solid surface is due to weak van der Waals forces.

A. If both (A) and (R) are correct, and (R) is the correct explanation of (A)

B. If both (A) and (R) are correct, but (R) is not the correct explanation of (A)

C. If (A) is correct, but (R) is incorrect

D. If (A) is incorrect, but (R) is correct

Answer: A

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108. Assertion:Isoelectric point is the pH at which colloidal particles can move towards either of the electrodes. Reason: At the isoelectric point, colloidal particles became electrically neutral.

A. If both (A) and (R) are correct, and (R) is the correct explanation of (A)

B. If both (A) and (R) are correct, but (R) is not the correct explanation of (A)

C. If (A) is correct, but (R) is incorrect

D. If (A) is incorrect, but (R) is correct

Answer: D

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109. Assertion: When KI solution is added to $AgN0_3$ solution, negativity charged sol results. Reason: Negative charge of AgI sol is due to

preferential adsorption of iodide ions from the dispersion medium.

A. If both (A) and (R) are correct, and (R) is the correct explanation of (A)

B. If both (A) and (R) are correct, but (R) is not the correct explanation of (A)

C. If (A) is correct, but (R) is incorrect

D. If (A) is incorrect, but (R) is correct

Answer: D

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110. Assertion: In the coagulation of a negative sol the flocculationg power is in the order:

$Al^{3+} > Ba^{2+} > Na^{+}$

Reason: Greater the valence of the flocculating ion added, greater is its power to cause precipitation.

A. If both (A) and (R) are correct, and (R) is the correct explanation of (A)

B. If both (A) and (R) are correct, but (R) is not the correct explanation of (A)

C. If (A) is correct, but (R) is incorrect

D. If (A) is incorrect, but (R) is correct

Answer: A

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111. Assertion:Lyophilic colloids have a unique property of protecting lyophobic colloids. , Reason: Lyophilic colloids are extensively solvated.

A. If both (A) and (R) are correct, and (R) is the correct explanation of (A)

B. If both (A) and (R) are correct, but (R) is not the correct explanation of (A)

C. If (A) is correct, but (R) is incorrect

D. If (A) is incorrect, but (R) is correct

Answer: B

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112. Assertion:Micelles are formed by surfactant molecules above the critical miceller concentration (CMC). Reason: The conductivity of a solution having sufficient molecules decreases sharply at the CMC.

A. If both (A) and (R) are correct, and (R) is the correct explanation of (A)

B. If both (A) and (R) are correct, but (R) is not the correct explanation of (A)

C. If (A) is correct, but (R) is incorrect

D. If (A) is incorrect, but (R) is correct

Answer: B

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113. Assertion:Langmuir adsorption is a single layer phenomenon.Reason: It is due to van der Waals forces.

A. If both (A) and (R) are correct, and (R) is the correct explanation of (A)

B. If both (A) and (R) are correct, but (R) is not the correct explanation of (A)

C. If (A) is correct, but (R) is incorrect

D. If (A) is incorrect, but (R) is correct

Answer: C

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114. Assertion:Aqueous gold sol is red in colour. Reason:The colour arises due to scattering of light by colloidal gold particles.

A. If both (A) and (R) are correct, and (R) is the correct explanation of (A)

B. If both (A) and (R) are correct, but (R) is not the correct explanation of (A)

C. If (A) is correct, but (R) is incorrect

D. If (A) is incorrect, but (R) is correct

Answer: A

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115. Assertion:The conversion of fresh precipitate to colloidal state is called peptization. Reason: It is caused by adsorption of common ions.

A. If both (A) and (R) are correct, and (R) is the correct explanation of (A)

B. If both (A) and (R) are correct, but (R) is not the correct explanation of (A)

C. If (A) is correct, but (R) is incorrect

D. If (A) is incorrect, but (R) is correct

Answer: B

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116. Assertion:In chemisorption, adsorptions keeps on increasing with temperature. Reason: Heat absorbed initially keeps on providing more and more of activation energy.

A. If both (A) and (R) are correct, and (R) is the correct explanation of (A)

B. If both (A) and (R) are correct, but (R) is not the correct explanation of (A)

C. If (A) is correct, but (R) is incorrect

D. If (A) is incorrect, but (R) is correct

Answer: D

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Level Ii Single Correct Answer Type

1. In presence of a catalyst, the activation energy is lowered by 3 kcal at $27^\circ C$. Hence, the rate of reaction will increase by:

A. 32 times

B. 243 times

C. 2 times

D. 148 times

Answer: D

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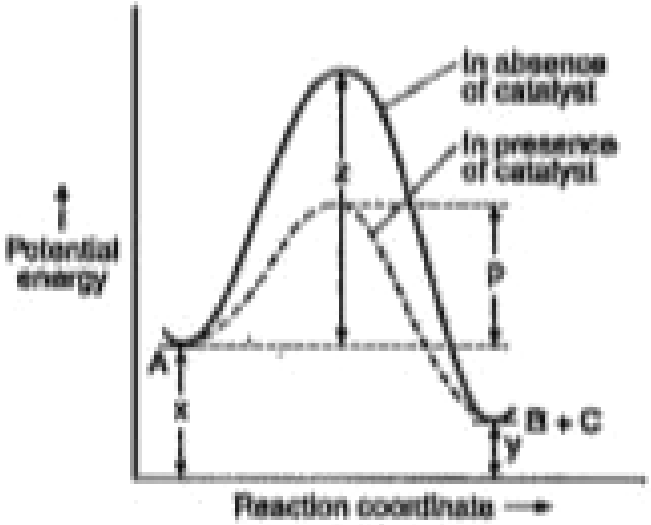
2. For the reaction $(A \rightarrow B + C)$, the energy profile diagram is given in the figure.



The decrease in energy of activation in presence of catalyst is:

A. Z

B. z-p

C. y-z

D. z-x

Answer: B

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3. Which of the following represents physical adsorption?

$(\#\#BRL_J \exists_M N_A DV_C HE_X II_V 01_C 05_E 03_{051} \_ Q01.\, png \quad \text{width=80 \%} >$

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4. Which of the following factors are respsonsible for the increase in the rate of a surface catalysed reaction?

I. A catalyst provides proper orientation for the reactant molecuels to

react.

II. Heat of adsorption of reactants on a catalyst helps reactant molecules to overcome activation energy.

III. The catalyst increases the activation energy of the reaction.

IV. Adsorption increases the local concentration of reactant molecules on the surface of the catalyst. Select the correct answer using the codes given below:

A. I and II

B. I and III

C. I,II and IV

D. I, II and III

Answer: C

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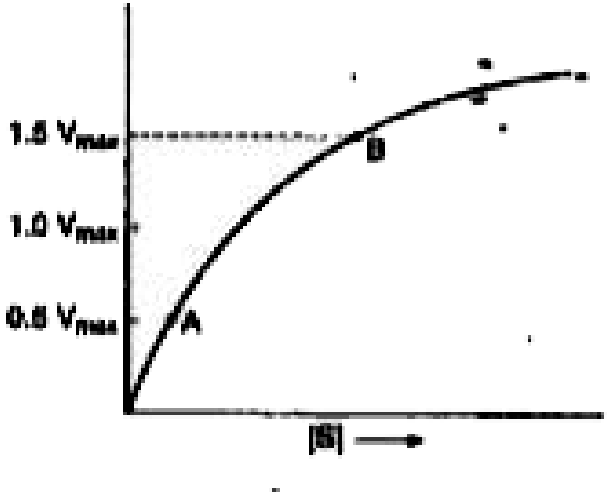
5. An ezyme [E] is combined with the substrate [S] as follows :

$$E + S \underset{k_4}{\overset{k_1}{\rightleftharpoons}} ES \xrightarrow{k_2} P + E$$

The overall reaction rate is given by , rate $= \frac{V_{\max}[S]}{K_m + [S]}$. The reaction rate varies with substrate concentration as :



The order of reaction at point A is :

A. one

B. two

C. three

D. zero

Answer: A

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

A. 1 g

B. 2 g

C. 3 g

D. 5 g

Answer: D

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7. Fora 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. log (1/11) appears as the intercept

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

C. 1/n appears as the intercept

D. Only 1/n appears as the slope

Answer: D

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8. The most appropriate method of making egg-albumin sol is

A. break an egg carefully and transfer the transparent part of the content to 100 mL of 5% w/V saline solution and stir well.

B. keep the egg in boiling water for 10 min. After removing the shell, transfer the yellow part of the content to 100 mL of 5% w/V saline solution and homogenize with a mechanical shakef.

C. keep the egg in boiling water for 10 min. After removing the shell, transfer the white part of the content to 100 mL of 5% w/V saline solution and homogenize with a mechanical shaker.

D. break an egg carefully and transfer only the yellow part of the content to 100 mL of 5% w/V saline solution and stir well.

Answer: A

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9. In a solution of 100 mL 0.5 M acetic acid, one g of active charcoal is added, which adsorbs acetic acid. It is found that the concentration of acetic acid becomes 0.49 M if surface area of charcoal is $3.01 \times 10^2 m^2$,

calculate the area occupied by single acetic acid molecule on surface of charcoal.

A. $2.5 \times 10^{-19} m^2$

B. $5 \times 10^{-19} m^2$

C. $0.5 \times 10^{-19} m^2$

D. $3.5 \times 10^{-19} m^2$

Answer: B

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Level Ii Multiple Correct Answer Type

1. Which of the following are correct statements

A. Spontaneous adsorption of gases on solid surface is an exotherinic process as entropy decreases during adsorption.

B. Fomation of micelles takes place when temperature is below Kraft Temperature (T) and concentration is above critical micelle concentration (CMC).

C. A colloid of $Fe(OH)_3$ is prepared by adding a little excess (required to completely precipitate Fe^{+3} ion s as $Fe(OH)_3$ of NaOH in $FeCl_3$ solution, then particles of this sol will move towards cathode during electrophoresis.

D. According to Hardy-Schulze rule the coagulating (flocculating) value of Fe^{3+} ions will be more than Ba^{2+} or Na^{+}.

Answer: A::C

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2. Select the correct statements for emulsions.

A. Oil in water type emulsion is less viscous than water in oil type

B. Oil in water type emulsion on dilution, a seperate layer foms

C. Water in oil type emulsion has low electrical conductivity

D. The process of making emulsion known as emulsification

Answer: A::C::D

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3. Which of the following are method of purification of colloids containing soluble impurities?

A. Dialysis

B. Electrodialysis

C. Peptization

D. Ultracentrifugation

Answer: A::B::D

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4. Select the correct statements.

A. The process of settling of colloidal particles is called coagulation

B. If the coagulated particles begin to float on the surface instead of setting down, then the process is called floculation

C. Coagulation of lyophilic sol is carried out by addition of electrolyte

D. When dialysis carried out in presence of electric field, then it is known as electrodialysis

Answer: A::B::C::D

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

A. a. Adsorption is always exothermic

B. b. Physisorption may transform into chemisorption at high temperature

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

D. d. Chemisorption is more exothemic than plıysisorption, however, it is very slow due to higher energy of activation.

Answer: A::B::D

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

A. Preferential adsorption of ions on their surface from the solution

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

C. Attraction between 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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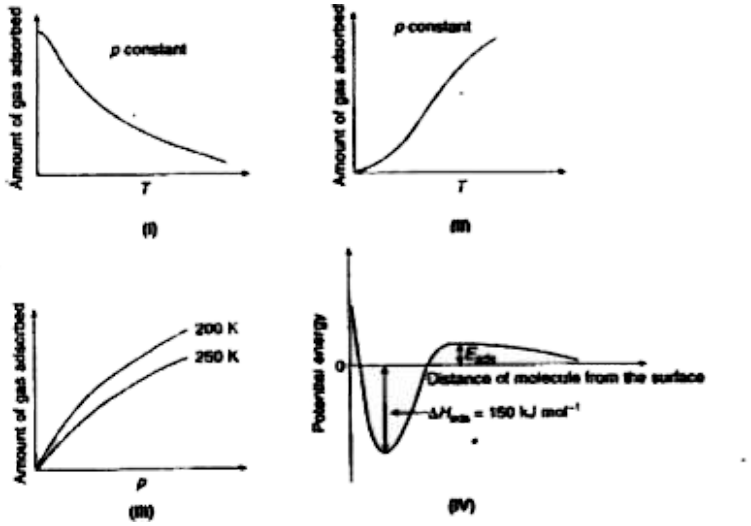
7. The given graphs/data I, II, III and IV represent general trends observed for different physisorption and chemisorption processes under mild conditions of temperature and pressure. Which of the

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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8. Which statements are correct about colloidal solution ?

A. Coagulating value $\propto \frac{1}{\text{Coagulating power}}$

B. Coagulating value $\propto$ charge on effective ion

C. Gold number $\propto \frac{1}{\text{Protective power}}$

D. Scattering $\text{or } \frac{1}{\lambda^4}$

Answer: A::C::D

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9. Which are not examples of autocatalysis?

A. A. Breakdown of atomic fuel in reactor

B. B. Shock decomposition of glycerol trinitrate

C. C. ZSM-5 used to convert alcohol to petrol

D. D. Storage of chloroform along with little ethanol

Answer: A::C::D

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10. Select the correct statements:

A. A. Gold sol prepared by different methods has altogether different colours due to size of gold particles in water

B. B. The potential difference between fixed layer and movable layer is called zeeta potential

C. C. At CMC, surfactant molecules undergo aggregation to form micelle

D. D. Micelle formation is independent of temperature

Answer: A::B::C

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

A. Preferential adsorption of ions on their surface from the solution

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

C. Attraction between 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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Level Ii Numerical Type

1. The mass adsorbed per gram of adsorbed O_2 having pressure 10 atmosphere at 400 K, if placed in contact with solid surface is 2 grain in one litre vessel. The pressure of O_2, after adsorption becomes 2

atmosphere. Assume no change in temperature and R=0.08 litre atmosphere $K^{-}mol^{-1}$ (ignore volume of adsorbent).

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2. 20% surface sites have adsorbed N_2 On heating N, gas is evolved from sites and were collected at 0.001 atm and 298 K in a container of volume $2.46cm^3$. Density of surface sites is $6.02 \times 10^{14}cm^{-2}$ and surface area is 1000 cm^2 Find out the number of surface sites occupied per molecule of N_2 .

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3. The chemisorption of H2 on an activated surface becomes 40% faster if temperature is raised from 500 K to 1000 K. Calculate energy of activation in KJ

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4. The coagulation of 100 mL of a colloidal solof gold is completely prevented by addition of 0.03 g of haemoglobin to it before adding 1 mL of 10% NaCl solution. Calculate the gold number of haemoglobin.

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5. 526.3 mL of 0.5 m HCl is shaken with 0.5g of activated charcoal and filtered. The concentration of the filtrate is reduced to 0.4 in. How many grams of HCl is adsorbed per gram of charcoal.

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6. In an adsorpion experiment, a graph between log (x/m) versus log P was found to be linear with a slope of 45°. The intercept on the yaxis was found to be 0.301. Calculate the amount of the gas adsorbed per gram of charcoal under a pressure of 3.0 atm.

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Level Ii Matching Column Type

1. Match the following columns

Column I		Column II	
A)	Dispersion of $Al(OH)_3$ by small quantity of $AlCl_3$	p)	Macromolecular colloid
B)	Addition of large quantity of $AlCl_3$ in (A)	q)	Selective adsorption
C)	Solution of haemoglobin in water	r)	Flocculation
D)	Chromatographic seperation of components of a solution	s)	Peptization

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2. Match the following columns

Column I		Column II	
A)	Placing silica gel in water vapour	p)	Enzyme catalysis
B)	Placing anhydrous $CaCl_2$ in water vapour	q)	Occlusion
C)	Placing finely divided Pd in a closed vessel containing H_2 gas	r)	Adsorption
D)	Conversion of proteins into amino acids	s)	Absorption

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3. Match the following columns

	Column I		Column II
A)	Physisorption	p)	Decreases the surface tension of the liquid surface
B)	Chemisorption	q)	Specific and increases with temperature initiallly
C)	Desorption of a solute on liquid	r)	Not very specific and decreases with temperature
D)	Adsorption of a solute on a liquid	s)	Increases the surface tension of the liquid surface
		t)	Adsorption is due to stronger interaction or bond formation

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4. Match the following columns

	Column I		Column II
A)	Bredig's arc method	p)	Movement of ions across the membrane in presence of electric field
B)	Electrodialysis	q)	Preparation of metals sols
C)	Ultracentrifugation	r)	Purification of sols
D)	Peptization	s)	Preparation of sols
		t)	The precipitate adsorbs one of the ions of the electrolyte on its surface

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Level Ii Statemetn Type

1. Statement 1 : According to Freundlich : $\frac{x}{m} = K_{.p}^{1/n}$

Statement 2 : The isotherm shows variation of the amount of gas adsorbent with temperature.

A. Statement 1 is True, statement 2 is True, Statement 2 is Correct explanation for Statement 1.

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

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

D. Statement 1 is False, Statement 2 is True.

Answer: C

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2. Statement 1 : The enthalpy of physisoption is greater than chemisorption.

Statement 2 : Molecules of adsorbate and adsorbent are held by van der Waal's forces in physisorption and by chemical bonds in chemisorption.

A. Statement 1 is True, statement 2 is True, Statement 2 is Correct explanation for Statement 1.

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

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

D. Statement 1 is False, Statement 2 is True.

Answer: D

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

Statement 2 : Higher the valency of the oppositely charged of the electrolyte added, higher is the coagulating power of the electrolyte.

A. Statement 1 is True, statement 2 is True, Statement 2 is Correct explanation for Statement 1.

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

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

D. Statement 1 is False, Statement 2 is True.

Answer: D

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4. Statement 1 : Lyophilic colloids have a unique property of protecting lyophobic colloids.

Statement 2 : Lyophilic colloids are extensively solvated.

A. Statement 1 is True, statement 2 is True, Statement 2 is Correct explanation for Statement 1.

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

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

D. Statement 1 is False, Statement 2 is True.

Answer: B

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5. Statement 1: The conversion of fresh precipitate to colloidal state is called peptization.

Statement 2 : It is caused by addition of common ions.

A. Statement 1 is True, statement 2 is True, Statement 2 is Correct explanation for Statement 1.

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

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

D. Statement 1 is False, Statement 2 is True.

Answer: B

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6. Statement 1 : The micelle formed by sodium stearate in water has $-COO^{\Theta}$ groups at the surface.

Statement 2 : Surface tension of water is reduced by addition of stearate.

A. Statement 1 is True, statement 2 is True, Statement 2 is Correct explanation for Statement 1.

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

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

D. Statement 1 is False, Statement 2 is True.

Answer: A

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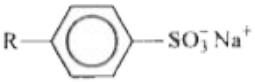
Level Ii Linked Comprehension Type

1. Water available in a village contains a lot of dissolved $CaCl_2$. Which of the following detergents is not suitable for washing purpose ?

A. 

B. $C_{17}H_{35}CO\overline{O}Na^{+}$

C. $C_{17}H_{35}N^{+}(CH_3)_3Br^{-}$

D. $CH_3(CH_2)OSO_3^{-}\,Na^{+}$

Answer: B

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2. Which of the following is non-ionic surfactant?

A. $C_{15}H_{31}COONa$

B. 

C. $CH_3(CH_2)_{11}N(CH_3)_3Br$

D. $C_{15}H_{31}COOCH_2-\underset{\displaystyle CH_2OH}{\overset{\displaystyle CH_2OH}{\overset{|}{\underset{|}{C}}}}-CH_2OH$

Answer: D

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3. Which of the following is not correct statement?

A. Micellization is a spontaneous process.

B. At critical micelle concentration conductivity, colligative properties, etc abruptly change.

C. Micellization is an irreversible process.

D. Below critical micellization concentration a surfactant has no detergent action.

Answer: C

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4. What is not true about chemisorption?

A. It forms monomolecular layer

B. The extent of adsorption is generally related to ease of liquefaction of gases

C. It is irreversible

D. It is highly specific

Answer: B

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5. Which of the following is known as Langmuir adsorption isotherm ?

A. $\frac{x}{m} = kP^{1/a}$

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

C. $\frac{x}{m} = \frac{k'P}{1 + kP}$

D. $\frac{x}{m} = kP$

Answer: C

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6. Lyophilic sols are more stable than lyophobic sols because

A. the colloidal particles have positive charge

B. the colloidal particles have negative charge

C. the colloidal particles are solvated

D. there is strong electrostatic repulsions between the particles

Answer: C

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7. Which one of the following forms micelles in aqeuous solution above certain concentration?

A. Dodecyl trimethyl ammonium chloride

B. Glucose

C. Urea

D. Pyridinium chloride

Answer: A

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8. Identify the correct statement about the colloids.

A. Colloidal sulphuris a substance

B. Colloid can be defined as homogenous system

C. A colloidal state is intermediate between a true solution and a suspension

D. None of these

Answer: C

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9. The diameter of colloidal particle ranges from

A. $10^{-9}m \text{ to } 10^{-6}m$

B. $10^{-9}m \text{ to } 10^{-12}m$

C. $10^{3}m \text{to} 10^{-3}m$

D. $10^{-3}m \text{to } 10^{-6}m$

Answer: A

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10. According to the adsorption theory of catalysis, the rate of reaction increases because

A. Adsorption lowers the activation energy of the reaction.

B. Concentration of reactant molecules at the active contres of the catalyst becomes high due to adsorption.

C. Adsorption increases the activation energy of the reaction.

D. Adsorption decreases the activation energy of the reaction.

Answer: B

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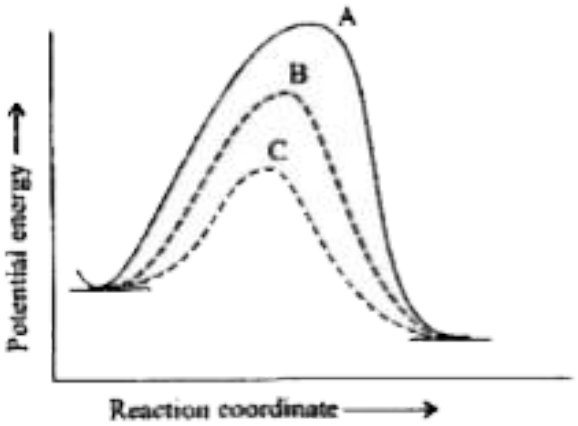
11. Substances which alter the velocity of a reaction by mere presence, without undergoing any change in mass and composition are termed catalysts and the phenomenon is known as catalysis.

In homogenous catalytic reactions, there are three alternative paths A, B and C (shown in figure). Which one of the following indicates the relative

case with which the reaction can take place?



A. $A > B > C$

B. $C > B > A$

C. $B > C > A$

D. $A = B = C$

Answer: B

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Question

1. A graph between (x/m) vs log p gives a striaght line with slope equal to 45° and intercept on the log (x/m) axis as 0.3 calculate the amount of gas adsorbed per gram of charcoal at a pressure of 0.95 atm

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2. The mass x of solute adsorbed per gram of a solid adsorbent is given by the freundlich adsorption isotherm as $x = kc^n$ where k and n are 0.160 and 0.431 respectively calculate the amount of acetic acid that 1 kg of charcoal adsorbs from 0.837 M vinegar solution

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